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SOME FEVERS OF SHORT DURATION: A REVIEW.

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INTRODUCTION.

Ever since the early period of the war there has been much published on these fevers of short duration, fevers variously described as one-day, three-day, five-day, six-day, seven-day and fourteen-day fevers. It cannot be too emphatically stated that these time designations in the nomenclature of disease are generally unscientific and often misleading; only second in unreliability to geographical names, such as Malta fever and Oriental sore—the former a world-wide disease, the latter found in America. Generally speaking, what is meant by one-day fever is a mild febricula due to climatic exposure or to some intestinal disturbance. Three-day fever is usually another term for sand-fly or Phlebotomus fever. Five-day fever was applied to trench fever. Six- and seven-day fever most often mean dengue or some of its very close varieties having modified symptoms dependent upon local conditions. The multiplication of terms leads to confusion, which, often repeated, obstructs progress and measures of prevention.

A real advance has, however, been made in the past ten years in tracking down the etiological factors, and in the study of the bionomics of the "carriers," but of the viruses we are still to a great extent ignorant whether they are filterable agents or of spirochaetal origin, though the Japanese have proved one form of seven-day fever to be due to the *Leptospira hebdomadalis*, which organism has been found in the blood and is passed out in the urine, and in Japan is thought to be carried by a species of field-mouse. This disease has many points of resemblance with dengue and the endemic fever found in the coastal towns of India, Ceylon, Africa, the Mediterranean, and America. It appears probable that all these dengue-like fevers are due to spirochaetal organisms which at some stage of their evolution are filter passers, and that a mosquito, generally a species of Stegomyia, acts as the carrier. Their distribution is practically circumtropical or subtropical, and it seems unnecessary to describe each geographical group under a different name.

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Pappataci, Phlebotomus or Three-Day Fever.

This disease was first definitely described by Doerr from cases in the Adriatic region, and was recognized clinically by McCarrison in Chitral (1903–4). In 1915 it was well described by Birt from observations made in India and Malta. He states that out of 71,000 European troops in India there were in 1912 as many as 2,163 admissions for this fever, and many that were mistaken for malaria ; since then, with knowledge of the cause, the numbers have been greatly reduced. Graham (1915) states that the optimum temperature for the development of the Phlebotomus imago is 70° to 80° F. in the Chitral valley ; Marett at Malta found it to be 70° F. Gabbi attributed the introduction of the fever into Sicily and Southern Italy to phlebotomus conveyed in wood cargoes from Dalmatia and Istria, and to earthquakes which provided in the ruined walls favourable breeding places. Bolt (1915) described cases of the fever and the prevalence of the flies in Northern China, the worst months being May and June. Sergent (1914) gave a good account of its prevalence in Algeria. In 1916 Sarrailhé and Armand-Delille described a short fever among the troops in the Dardanelles in the presence of *P. papatasii* ; this fever they unfortunately called " Mediterranean dengue." Other cases at Salonika, lasting five to six days, often showed a dengue-like eruption. Adrien also uses this name for a three-day fever in Syria, when both mosquitoes and sand-flies were abundant.

Throughout the war epidemics of three-day fever were described from many places in the Eastern Mediterranean among the naval and military forces when phlebotomus were always prevalent. In 1916 Legendre found *P. papatasii* in the valley of the Somme, but no endemic cases, and in the same year Langeron found females in the Seine valley, near Paris. Harnett (1916) suggests that about 20 per cent. of sand-fly fever cases run a severe course and last five to six days, and he draws no distinction between the three-day fever and the six-day fever of India. Lambert, in an epidemic of 237 cases at Lemnos, states that the duration in 29 per cent. was four days, and three days in only 14 per cent., and that second attacks were uncommon, immunity being established in 90 per cent. ; on the other hand, Delmege and Staddon, in Macedonia, state that reinfections were comparatively common. Brack, in Turkey, found relapses uncommon, and he noticed that horses at this time suffered from a short fever of a similar nature.

Jouin (1918), who made observations on the blood-pressure, found that the maximum was raised during the first 12 hours and then fell slightly ; after 24 to 72 hours it again rose to normal ; the minimum is generally low in the first 12 hours, and after 24 hours rises to normal ; in all cases there is a marked bradycardia due to increased irritability of the vagus caused by the virus acting on the bulb centres.

The chief " carrier " of infection is the *P. papatasii*, but *P. minutus* var. *africanus*, *P. perniciosus*, and *P. major* var. *chinense*, Newstead, are probably also able to infect in different regions.

Roubaud states that *P. minutus* var. *africanus* has a wide distribution in Africa ; he agrees with Howlett that it feeds on lizards and snakes ; Townsend also mentions that *P. verrucosus* of Peru feeds upon the blood of lizards. It is known that a blood feed is essential for fertilization of the eggs.

During the great influenza epidemic of 1918 the diagnosis from phlebotomus fever was often very difficult and the statistics were involved.

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* References are to summaries in the *Tropical Diseases Bulletin*, unless otherwise stated. Dates in parentheses refer to year of publication of original paper.

DENGUE.

The chief interest of dengue depends upon its symptomatic relationship with yellow fever on the one hand, and, on the other, with the so-called six- and seven-day fevers described by ROGERS in India and DEEKS at Panama, on the mosquito-borne theory of transmission, and on the character of the virus which causes the disease. Since the work of ASHBURN and CRAIG, there has been abundant evidence that a mosquito is the carrier, but the kind may vary in different localities, possibly *Culex fatigans* in Asia Minor, and a Stegomyia, as definitely proved in Australia by CLELAND, BRADLEY and MCDONALD and in the South Sea Islands. A Stegomyia was believed by LALOR to be the carrier of the seven-day fever in Rangoon, and this suggested an affinity with yellow fever. In the Anglo-Egyptian Sudan, ARCHIBALD (1917) also considered that *S. fasciata* was the carrier of the dengue-like fever there.

The disease is very widely distributed, epidemics occurring in the Mediterranean area, Asia Minor, North Africa, West Africa, Equatorial Africa, India, Philippines, China, Formosa, Mauritius, West Indies, Tropical America, Argentina and Uruguay, etc. Up to 1916 the disease had not been recognized in Argentina. KRAUS then reported an epidemic which attacked nearly the whole of the population and was diagnosed as dengue; both culex and stegomyia were very prevalent. The symptoms were fever, pain in head, eyes, muscles, and joints, with a polymorphic eruption followed by desquamation; the blood showed a leucopenia, the convalescent stage was worse than the febrile owing to the pains; there were no deaths. The epidemics of fever described by CLELAND, BRADLEY and MCDONALD, with the above, link up in a remarkable way true dengue with the seven-day fever of ROGERS.

A very careful study of the disease in Formosa was made by KOIZUMI, YAMAGUCHI and TONOMURA. Clinically the disease was typical and there was only one death out of 6,000 cases; parasites were never found in the blood, but a leucopenia was constant. Injection of defibrinated blood from a dengue patient gave negative results with dogs, rabbits, white mice, and monkeys, but guinea-pigs died after 7–36 days and the blood infection was transferable to other guinea-pigs. CLELAND and BRADLEY were able to pass the disease by artificial inoculation through four generations, and they found

that the virus was present in the blood from 18 to 90 hours after the onset of the fever. The transference of as small a quantity at 0·00005 mil. from man to man was found to be infective (KOIZUMI, YAMAGUCHI and TONOMURA), and these workers were able to transmit the disease by stegomyia and not by culex, so that the rôle of the latter, if positive, must be very restricted.

COUVY, at Beyrouth, Syria, states that during a severe epidemic he has found delicate spirochetes in the blood immediately before the onset of the fever.

GOLDSMID, in Australia, has mentioned purpuric complications; these are very rare and in his cases were possibly due to old malaria.

In 1920, CRAIG, who believes that the disease is due to a spirochaetal infection, suggested that investigations should be carried out similar to those of yellow fever; for we know that the virus is in the blood, that it is a filter passer, that the filtrate is infective, and that a stegomyia is commonly the carrier. A systematic use of the dark ground illuminator, and of NOGUCHI's culture media, as used for the Leptospira of yellow fever and spirochaetal jaundice, will probably lead to positive discoveries in dengue.

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JAPANESE RIVER FEVER OR TSUTSUGAMUSHI DISEASE.

This fever has been most frequently described from Japan and Formosa, but according to old Chinese literature it has been present in China for a very long time. It was originally mistaken for typhus and was first scientifically studied in 1879 by BÄLZ and KAWAKAMI, who called it "flood fever." The facts are now established that the disease is attributable to the bite of a species of mite, *Leptus akamushi*, Brumpt, which is found mostly in the summer months in low-lying areas, abundantly infesting the ears of field-mice and other rodents. The mite is probably distributed also by a small field-warbler, *Acrocephalus orientale*, and other local birds.

The virus is present in the blood in an early stage of the disease and a minute quantity of blood, 0·001 mil., is infective. The infective agent, as discovered by HAYASHI (1917), occurs as minute rods, spherical or ring-shaped bodies, in the lymph glands, endothelial cells of the spleen and lymph nodes, as well as in the blood, generally free but rarely in the red cells; the provisional name *Theileria tsutsugamushi* is suggested for it. There appears to be a vegetative and a generative cycle, with a great similarity to the bodies found by WOLBACH in cases of Rocky Mountain fever.

OGATA (1917) stated the cause of the fever to be a filamentous fungus, which he obtained from the eruption and the blood and was able to grow on solid media, and that from the pure cultures he

produced the disease experimentally in guinea-pigs and rabbits, just as readily as from tissue emulsions or the blood of infected cases. So far these statements have not been confirmed; the cultural experiments of HAYASHI were completely negative.

The disease has been transmitted experimentally to monkeys, guinea-pigs, rabbits, and calves.

A great deal has been written about the development and life-history of the mite, which has variously been described as *Trombidium*, *Leptotrombidium* and *Leptus akamushi*; much of this is very technical (NAGAYO, MIYAGAWA, MITAMURA and others).

The disease occurs endemically and is characterized by skin lesions, swollen lymphatic glands, and high fever. In Japan, during 1889–1909, there were 1,520 cases, with 420 deaths, or 27·9 per cent. The outbreak coincided with the appearance of the field mouse, driven by the floods from place to place carrying akamushi larvae with them. The incubation is from seven to ten days, and the rash appears from the fifth to the ninth day (KATISHIMA, MIYAJIMA).

Treatment.—The excision of the primary lesion is recommended, and some success has been obtained by the early use of immune serum of monkeys and cattle. For prevention it is important to destroy the mites on the infected soil, as well as to defend the body from the attacks of the parasite. Cresol soap solution, 100 per cent., was found effective. In a very infested district the soil was treated for 59 days, and the clothes of the labourers were well sprayed; among these, averaging 89 per day and treated for 44 days, not a single case of infection occurred (KAWAMURA, HATTORI and YAMAGUCHI, 1920).

In Formosa the disease is very widely spread and is not confined to the valleys; it is also present in Korea, and according to ASHBURN and CRAIG perhaps in the Philippines. A similar mite-borne disease was described from Deli, Sumatra, by SCHÜFFNER (1914) under the term of pseudo-typhus, a name rather extensively used for a disease of about 14 days' duration associated with a marked and rather typhus-like eruption, but having a low mortality, in all cases transmitted by a blood-sucking ectoparasite, not always determined.

In 1921 MEGAW summarized this group of typhus-like fevers.

TYPHUS GROUP.

Louse Typhus.	Tick Typhus.	Mite Typhus.
A louse-borne disease of filth, crowding, poverty :—	A disease of open-air life in the wilds :—	A disease of recently flooded places :—
A. Severe typhus (mortality high).	A. Rocky Mountain fever :— (1) Montana type (high mortality —60 per cent.). (2) Idaho type (low-mortality —18 per cent.).	A. Tsutsugamushi (high mortality—up to 55 per cent.).
B. Mild typhus or Brill's disease (mortality low).	B. (?) Tick typhus of Kumaon and other places in India (low mortality—about 5–10 per cent.).	B. Sumatra tick typhus (low mortality).
C. Tabardillo or Mexican typhus.		

To these must probably be added, the macular fever of Tunisia [Conor and Bruch], a fever in Korea [Weir (1915)], one in the Federated Malay States [Dowden (1915)], one in Saigon [Noc and Gautron (1915)], and a form in Nigeria [Davies & Johnson (1921)].

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Megaw (1921), xix, 67.
Nagayo, Miyagawa, Mitamura & Imamura (1917), xiii, 342.
Noc & Gautron (1915), vi, 316.
Ogata (1917), x, 184.
Schüffner (1914), v, 360.
Weir (1915), v, 361.

Rocky Mountain Spotted Fever.

Much progress has been made during the past ten years in determining the cause and means of prevention of this disease. In the excellent monograph by Wolbach, of Harvard (1919), is contained all the known information, consisting very largely of his own work. The fever is found in Idaho, Montana, Wyoming, Utah, Nevada, Oregon, Colorado, Washington State, probably in Alaska ; and Kelly has shown that it exists in California, where it has probably been endemic for a long time, and is of a rather less severe type than that of Montana but more than that of Idaho.

The virus is a form of Rickettsia body called by Wolbach *Dermacentroxenus rickettsi*, a new form of organism, not an ordinary bacterium, but not having a complicated life-cycle as in protozoa. It is transmitted by a tick, *Dermacentor venustus*, the larval and nymph stages of which are passed chiefly on ground squirrels, wood-chucks, chipmunks, and many other rodents, which may act as reservoirs.

The areas of infection are sharply limited, but differ immensely in their mortality rate, for in Montana it may be as high as 90 per cent. whereas in Idaho it is only 5 per cent. April, May, and June are the most unhealthy months.

The disease has to be differentiated from typhus and enteric. The essential lesions are found in the vascular system ; the infecting organisms are present in large numbers in the endothelial cells, which accumulate in the vessel walls, round the vessels, and in the lymphatics, particularly of the skin and genitalia ; the haemorrhagic lesions of the genitalia are characteristic. Fricks (1916) obtained from the blood of infected animals ten strains of anaerobic bacilli ; these were not pathogenic to guinea-pigs, but if the cultures were inoculated from the twenty-first to the twenty-fifth day into other guinea-pigs they gave rise to the definite lesions of Rocky Mountain fever, showing that there was some multiplication of the virus in the cultures.

In the Montana type as described by MICHIE and PARSONS (1916) the symptoms are very severe, with sudden onset, continued fever, enlarged spleen, early albuminuria, slow pulse, pains in head, neck, back and joints, and peculiar eruption.

Most of the ticks which transmit spotted fever in Montana develop on animals grazing over the foothills during the spring months, when systematic dipping is found to be unsatisfactory, and the destruction of wild rodents is more practicable. It was believed that sheep might prove useful in clearing off the ticks, which become entangled in the wool and die; but an experiment made with 1,000 sheep in an area of 1,200 acres was not successful; enough ticks remained to keep up a normal supply [KING (1916)]. PARKER insists that protective measures successful in one part may not be applicable in another, and mentions as examples Eastern and Western Montana. In the former place the hosts of the ticks, both wild and domesticated, have unrestricted freedom and the infestation is naturally less than in areas such as the Bitter Root Valley in Western Montana, which is fenced.

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PARKER (1918), xii, 87; (1920) xvi, 113; (1921) xix, 119.
WOLBACH (1916), viii, 284; (1916), ix, 64; (1918), xii, 87; (1919), xvi, 420.

OROYA FEVER AND VERRUGA PERUVIANA.

STRONG, TYZZER and SELLARDS, in various papers and finally in an excellent monograph, published by the Harvard School of Tropical Medicine (1915), have described the results of their investigations of these conditions. Their conclusion is that Oroya fever and Verruga peruviana are two separate and etiologically different diseases, the former not being limited to the Oroya valley. In Oroya fever are found the intra-corpuscular bodies, "*Bartonella bacilliformis*," causative of the disease. These bodies multiply in the endothelial cells of the spleen and lymph glands; the little spheres which are present resolve into a large number of minute elements, each containing a chromatin granule; these elongate and finally appear as distinct rods having a granule of chromatin at one end. When the spheres rupture and the bodies are set free the rods are most apparent and are identical with the bodies seen in the red cells of the peripheral blood. The appearance of the infected endothelial cells is like that of the life-cycle of *Theileria parva*, as figured by GONDER, and suggests that the bodies are of a protozoal nature. Though verruga can easily be transmitted to animals, they were unable to transmit the parasite of Oroya fever either by subcutaneous, intravenous or intratesticular inoculations.

They were able to pass the virus of verruga, which, however, becomes attenuated, through 12 successive monkeys; it appears to be filterable, but its nature was not actually discovered. Inoculation of verruga material into a human volunteer produced none of the blood changes seen in Oroya fever, but gave rise to a local infection of verruga which was passed on to an animal. This and other experiments proved the duality of the diseases.

Townsend, on the other hand, still maintains that Oroya fever and verruga are both transmitted by *Phlebotomus verrucarum*, found in the verruga zone, and are manifestations of one disease, but his etiological researches and his animal experiments are not convincing. It appears quite certain from the reports of Gomez (1913–15) that the infection of Oroya fever is spread by some night-biting insect, for it is the experience of all travellers in Peru that the disease is contracted if the night is spent in the locality, whereas passing through in the daytime is quite safe. Epidemics among gangs of labourers engaged on engineering works may be cut short by the use of mosquito curtains or by the removal of the men to sleeping quarters elsewhere at the end of the day.

Townsend could find no evidence that either mosquitoes or ticks transmit the disease, the nocturnal vector of which, while abundant in the wet season, is never altogether absent, and he considers that *P. verrucarum* is the only form that meets all these requirements.

Hercelles (1918), writing on the histo-pathology of the spleen in Oroya fever, states that the organ is greatly enlarged from the increase of lymphoid tissue; later there is extreme thrombosis producing infarcts and afterwards shrinking and puckering. He thinks that these changes may assist in producing the intense anaemia. According to Strong and his co-workers these changes are due to a toxic substance produced by the specific parasite.

At present the balance of evidence favours the view that the two conditions so common in the same district are different entities, and that Oroya fever is conveyed by a night-biting insect, probably *P. verrucarum*. Further experiments are required on the transference of both diseases to animals and the production of immunity reactions.

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Harvard School of Tropical Medicine. Report of First Expedition to South America, 1913 (1915), vii, 70.
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Strong & Tyzzer & Sellards (1915), v, 368; (1915), vi, 322.
Townsend (1914–15), vi, 323; (1915), viii, 287; (1916), viii, 288.

MEDICAL ZOOLOGY.

GUNN (Herbert). *Councilmania lafleuri* **not a New Amoeba.**—*Jl. Parasit.*. 1922. Sept. Vol. 9. No. 1. pp. 24–27.

The author has made a comparative study of eight cases of "Councilmania lafleuri" infection and specimens from *Entamoeba coli* infections, all the material in question being authenticated from Dr. KOFOID's laboratory, and he here gives a critical summary of the result. It is perhaps enough to say that he finds that the deeply-staining ridge and the budding, characteristic of "Councilmania," can be produced in cysts of *E. coli* by pressure on the cover-slip, and that he agrees with WENYON's verdict (this *Bulletin*, Vol. 19, pp. 19–22) relegating *Councilmania lafleuri* to the weary list of synonyms of *E. coli*.

A. Alcock.

LYNCH (Kenneth M.). **Cultivation of** *Trichomonas* **and the Question of Differentiation of the Flagellates.**—*Jl. Amer. Med. Assoc.* 1922. Sept. 30. Vol. 79. No. 14. pp. 1130–1133. With 13 figs.

The author gives historical and specific details of the cultivation of Trichomonas. He considers that all the circumstances of its existence at present known point to its being a harmless commensal in the human body. The specific conceptions must be clarified, and this would best be done by culture of different material in identical media.

A. A.

PARISOT (J.) & SIMONIN (P.). **Gangrène pulmonaire et** *Trichomonas*. —*C.R. Soc. Biol.* 1921. Dec. 10. Vol. 85. No. 36. pp. 1077–1079.

The authors refer to an observation by A. SCHMIDT (*Münch. Med. Woch.*, 1895, No. 51) of a Trichomonas, which he called *T. pulmonalis*, in a case of pulmonary gangrene, and give a further reference to VERDUN, *Précis de Parasitologie humaine*, 2nd ed., p. 156. They continue with an abstract of a case of their own—a case of chronic pulmonary trouble, at last ending fatally after rupture of a large abscess, in the expectoration of which *Trichomonas intestinalis* was found, along with a multitude of other "germs." Post-mortem almost the whole of the lower left lung was on the road to gangrene and more or less infiltrated with pus, *T. intestinalis* being abundant in the morbid area, but *not* elsewhere. The authors are content to emphasize this last fact.

A. A.

HARTWELL (J. B.). [*Trichomonas vaginalis* **Vaginitis.**]—*Colorado Med.* Denver. 1922. Apr. Vol. 19. No. 3. [Summarized in *Jl. Amer. Med. Assoc.* 1922. May 13. Vol. 78. No. 19. p. 1488.]

Deals with treatment, the principle of which is to keep the vagina strongly alkaline, the alkalinity seeming to be fatal to the flagellate.

A. A.

Da Cunha (Aristides Marques) & Julio Muniz. **Sobre um flagellado parasito do gato. (Nota prévia.)**—*Brazil Medico.* 1922. June 3. Year 36. Vol. 1. No. 22. pp. 285–286. With 1 text fig.

Description and figure of a "new" Trichomonas (*T. felis*) from the large intestine of a cat.

A. A.

Simon (Sidney K.). **Further Observations of *Lamblia intestinalis* Infestation and its Treatment.**—*Southern Med. Jl.* 1922. June. Vol. 15. No. 6. pp. 458–462.

Abstracts of eight cases—three of them under ten years of age—of infection with *Giardia intestinalis*. In all there was abdominal pain or discomfort due to gas. In five there was not any history of diarrhoea, in the other three irregular outbursts of diarrhoea alternated with constipation. In one case the gall-bladder was inflamed, and large numbers of free forms of the parasite came away in the drainage; it is conceivable that the parasite may have infected the gall-bladder with bacteria from the intestine. Six of the cases here reported were treated with arsphenamin, in one case through the duodenal tube, in the other five intravenously; in every instance cysts at once disappeared from the stools, and, so far as the author can learn, have not reappeared.

A. A.

Knighton (J. E.). *Lamblia intestinalis* **with Report of Cases.**—*Southern Med. Jl.* 1922. June. Vol. 15. No. 6. pp. 457–458.

Remarks on three cases in which an infection with *Giardia intestinalis* was discovered by duodeno-biliary drainage for chronic cholecystitis. The parasites had invaded the bile-ducts and gall-bladder, but it is not stated that they actually caused the cholecystitis. Only one of the cases had been troubled with diarrhoea, and that one many years before. Duodenal lavage or duodeno-biliary drainage gives only temporary relief.

A. A.

de Buen (S.). **El *Lamblia intestinalis* en Espana.**—*Laboratorio.* Mar. 21. Vol. 5. pp. 923–927. [Summarized in *Bull. Inst. Pasteur.* 1922. June 30. Vol. 20. No. 12. p. 494.]

Three cases of Lamblia infection in children of three years; said to be the first cases reported in Spain.

A. A.

Kotlán (A.). **Giardien (Lamblien) in Vögeln.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Mar. 14. Vol. 88. No. 1. pp. 54–57. With 2 text figs.

The author figures two species of Giardia (=Lamblia), one from the red-backed shrike, the other from the avocet. In both birds there was wasting and intestinal inflammation, which the author is inclined to attribute to the parasite.

A. A.

Glaser (R. W.). *Herpetomonas Muscae-domesticae*, **its Behaviour and Effect in Laboratory Animals.** — *Jl. Parasit.* 1922. Mar. Vol. 8. No. 3. pp. 99–108. With 1 plate.

Working at Princeton the author found house-flies to be particularly well infected with *Herpetomonas muscae-domesticae* in the months July–September. Injecting (per peritoneum) six mice, a rat, and a guinea-pig with the intestinal contents of such flies, he obtained no positive results of any kind. The blood of all the animals was examined at frequent intervals, two of the mice were autopsied at the end of a month, two after two months, the other two and the rat after three months; no parasites were found in the blood, and all the organs in every autopsied case were normal and free from parasites. The guinea-pig at the end of five months is still alive; at no time did it have fever or lose weight.

A. A.

i. Roubaud (E.) & Franchini (G.). **Infection naturelle de la souris par les flagellés de la puce** *Ctenopsylla musculi*, **Dug.**—*Bull. Soc. Path Exot.* 1922. June 14. Vol. 15. No. 6. pp. 405–406.

ii. —— & ——. **Infection leishmaniforme produite chez la souris par l'inoculation des fèces de la puce** *Ctenopsylla musculi*.—*Ibid.* p. 407.

i. In October an adult mouse is put in a jar with some *Ctenopsylla musculi* with a view to raising a crop of the fleas. In January following there are so many fleas that the mouse has to be taken away from them. The mouse, however, remains sick and sorry, and on March 23 is found dead. At the autopsy the spleen is voluminous; there is ascites; round or piriform bodies, with or without blepharoplast, are abundant in smears of spleen, and are also found in liver, lungs, and bone-marrow, and occasionally in blood smears. [Some fleas examined at the time of the removal of the mouse had shown *Herpetomonas ctenopsyllae*.]

On March 24 mouse No. 2 receives a subcutaneous inoculation of spleen-juice of mouse No. 1. On June 9 it is killed; its spleen is hypertrophied, and some of the leishmaniform parasites are found in it and the other organs.

On March 15 mouse No. 3 had been placed in the flea-jar where the fleas were abundant. On March 31 it is dead. Its spleen is enormous; some leishmaniform parasites are found in it and the other organs, and there are some in blood smears.

On May 15 mouse No. 4 is placed in the flea-jar where a few fleas remain. It is killed on June 9. Its spleen is slightly enlarged and shows some of the parasites.

On March 1 mouse No. 5 had been placed in the flea-jar where the fleas were very numerous. Its blood, when examined on March 15 and 20 and April 2, showed some leishmaniform or uninuclear parasites, some endoglobular and some free. It died on April 15. Its spleen is found to be enormous; numerous parasites are found in it, and some also in smears of liver, lung, and bone-marrow, a few also in blood smears.

On April 15 mouse No. 6 had been placed in the flea-jar where the fleas were very numerous. The blood examined on April 20 did not disclose any parasites, but on May 2 one parasite was found in a smear. On May 10, when the animal was killed, its spleen was enlarged. Smears of blood, liver, and spleen—but not of lungs and bone-marrow—showed a few of the parasites.

ii. The dead mice of the above experiments were covered with dried excrements of *Ctenopsylla musculi*. Some of the excrement, at least 24 hours old, ground down in physiological saline, was injected under the skin of a nearly adult mouse. Fifteen days afterwards, and onwards, rare leishmaniform parasites could be found in the blood. On the 69th day the mouse was killed; its spleen was hypertrophied and leishmaniform parasites were present in smears of spleen, liver, lungs, kidneys, bone-marrow and blood.

[It is to be noted that in the parasites described in this experiment as leishmaniform the blepharoplast is stated to have been "rarement bien visible."]

A. A.

Buchner. **Sind die Crithidien der Schaflaus für Mäuse pathogen?** [Is the Crithidia of the Sheep-Ked Pathogenic to Mice?]—*Ztschr. f. Hyg. u. Infektionskr.* 1922. Vol. 95. No. 1. pp. 115–118.

This paper has a critical bearing on the subject of insect flagellates as the source of leishmaniasis of vertebrates [see this *Bulletin*, Vol. 18, p. 12]. Laveran and Franchini (*Bulletin*, Vol. 15, p. 148) succeeded in infecting white mice with crithidia from the ked; the infection was pathogenic to the mice and gave issue among other things to leishmanic forms. This result is rather surprising, since Nöller has given good reasons for regarding the crithidia of the ked as an antecedent form of the specific trypanosome of the sheep.

The author of the present paper has repeated the experiments of Laveran and Franchini. He has injected fresh material from the gut of the ked, along with physiological saline solution, under the skin and into the peritoneal cavity of white mice, and also has fed white mice with the same material. His experiments are here fully described and recorded. In no case has he succeeded in infecting white mice with crithidia of the ked, or observed the phenomena described in the account of the Laveran and Franchini experiments.

A. A.

Connal (A.) & Young (W. A.). **A Case of Human Coccidiosis in Nigeria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 90–93. With a Note by Clifford Dobell.—pp. 93–94.

The patient in this case had never been out of England before his departure for West Africa. During the two years prior to seeking medical assistance in West Africa he had had several attacks of diarrhoea. After coming under treatment his faeces were constantly examined; they were found to contain epithelial cells, pus cells, Charcot-Leyden crystals, a few doubtful and degenerate *Entamoeba histolytica* on one occasion only, and on four successive occasions oocysts of a coccidium which were identified as *Isospora hominis*—an identification subsequently confirmed by Dobell. Under emetine and alcresta all signs of intestinal confusion ceased and the patient improved rapidly, although epithelial cells and pus cells were still observed in the stools for some time.

A. A.

Brug (S. L.). **Coccidiose bij den mensch.** [Coccidiosis in Man.]— *Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 3. pp. 363–371. With 1 plate.

Three cases of infection with *Isospora hominis* in persons who had never left the Dutch East Indies. Two were healthy, the third suffered from subacute diarrhoea, probably not due to the Coccidia.

Brug is in doubt, whether the Eimeria, found by Snijders in a human stool (see this *Bulletin*, Vol. 18, p. 187), is to be considered as a human parasite. The fact that natives of eastern countries often eat insects, as well as animal intestines and livers, may explain the temporary, occasional presence of great numbers of unusual cysts in the stools. Snijders found degenerated besides sound-looking cysts; Brug thinks that this may be induced by uneven action of noxious influences (partial heating) on the cysts during the preparation of the infectious meal.

W. J. Bais.

Shortt (H. E.). **Review of the Position of the Genus *Haemocystidium* (Castellani and Willey, 1904), with a Description of Two New Species.**— *Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 814–826. With 1 coloured plate.

The species of "Haemocystidium" are considered in historic sequence and good reasons are given for the conclusion that they all ought to be included in the genus *Haemoproteus*, of which "Haemocystidium" then becomes merely a synonym. The species of Haemoproteus as thus conceived are listed in chronological order. The list includes two new species (*H. phyllodactyli* from *Phyllodactylus elisae*, and *H. grahami* from *Agama nupta* var. *fusca*), which are described and figured. A list of references to original papers completes the business.

It is thus that all new species ought to be introduced into zoology.

A. A.

Walch (E.). **Sur les "Black spores" et autres corps chitinisés dans les Anophèles.** *C.R. du 4ième Congrès de "Far Eastern Assoc. of Trop. Med."*—7 pp. With 2 plates. Weltevreden: Javasche Boekhandel en Drukkerij Rijswijk.

The author agrees with Brug that the "black spores" seen in Proteosoma-infected Culex and malaria-infected Anopheles are degenerated oocysts encapsuled in chitinous deposit. He has seen similar spores in Anopheles not infected with malaria, and has also seen a hyphomycetes, that had found its way through the oesophagus of a mosquito, enveloped in chitin. Also one may sometimes find sporozoites chitinized in the abdomen far from the stomach.

A. A.

Sergent (Edm. & Et.) & Parrot (L.). **Sur une hémogrégarine de l'homme, observée en Corse.** *Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 193–197. With 1 fig.

The haemogregarine here described and figured as a new species, *Haemogregarina elliptica*, was observed in a Corsican girl of three years, free from malaria and apparently in good health; 2 in 16

were lodged in red corpuscles, the rest were free in the blood. The infected corpuscles were neither enlarged nor otherwise altered in appearance; the included parasites were small slender subcrescentic rods, with a homogeneous non-vacuolated cytoplasm, a compact nucleus lying to one side near the middle, and a large chromatin granule; they are regarded as merozoites. The free parasites are elongate-elliptical, sometimes subreniform, and never have a recurved "tail"; most of them are 5–6μ long, but one was only 1–2μ and some were as much as 10–11μ, and between these extremes every gradation was observed. Among the forms over 5μ long, some were encapsulated; others were elliptical cysts with a friable nucleus and numerous granules of chromatin; others still were elongate cysts with two polygonal nuclei—probably schizonts.

In form and size this species differs from *H. hominis* Krempf (1917), and in size and the absence of a recurved tail from *H. inexpectata* Roubaud (1919); but it shows some approximations to the parasite described by Fedorovitch in a case of splenomegaly in 1916 and thought by Castellani to be similar to his *Toxoplasma pyrogenes* [see this *Bulletin*, Vol. 8, p. 424].

A. A.

Shortt (H. E.). **Notes on Two Haemogregarines of Persian Lizards.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 827–829. With 1 plate.

The two new species of Haemogregarines here described—*Haemogregarina procteri* from *Phyllodactylus elisae*, and *Haemogregarina percomsi* from *Agama nupta* var. *fusca*—are, so far as the forms seen in the blood-circulation go, alike, and of the common reptilian type; but their schizogony forms are different.

In *H. procteri* two kinds of schizogony were observed: (*a*) in red cells in spleen and liver and in capillaries of lungs, resulting in destruction of the red cell and the formation of small merozoites; and (*b*) in the endothelial cells of the air-spaces of the lungs, resulting in the formation of large sausage-shaped merozoites. In *H. percomsi* only the latter form of schizogony was observed.

A. A.

Lynch (Kenneth M.). **Blastocystis Species in Culture. A Preliminary Communication.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 215–220. With 1 plate.

The author has cultivated Blastocystis in blood serum and in albuminous exudates, pure, or diluted with Noll solution of varied strength. In his cultures he has observed three methods of reproduction, namely, (1) fission (commonly, but not always, binary), (2) peripheral gemination (which may be regular and symmetrical or not, and may occur while fission is in progress or afterwards), and (3) a process resembling endosporulation (a complicated process, one phase of which suggests sexual conjugation). He considers that these three methods are evidence of specific distinction.

A. A.

Marzinowsky (E. J.). **On *Grahamella*.**—Reprinted from *Medicinskoye Obozreniye* (*Med. Review*). Moscow. 1917. No. 1–2. 4 pp. With 1 plate.

After a brief historical survey of the question, the author records his finding of Grahamella in the blood of cattle—in the red corpuscles

and free in the serum. Similar bodies were encountered within large cells of the type of macrophages in the intestine of a tick, *Boophilus calcaratus*, collected from an infected animal. The author refers these bodies to the Protozoa, and believes that they are transmitted to cattle through the bite of the tick. He proposes to name them *Grahamella bovis*. The paper is illustrated by three photomicrographs.

C. A. Hoare.

Mesnil (Félix). **La " Flagellose " ou " Leptomoniase " des euphorbes et des asclépiadacées.**— *Ann. Sci. Nat., Botanique.* 1921. Dec. Vol. 3. No. 5–6. pp. 42–57. With 4 text figs.

This is a convenient summary of recent work on the subject.

The author starts with the discovery, in 1909, by Surgeon-Major A. Lafont and his attendant David, of *Leptomonas davidi* in the milky juice of Euphorbias, the confirmation of this discovery in many parts of the world, and the discovery by França, in 1920, of the evolution of the parasite in the Coreid bug, *Stenocephalus agilis*.

Almost all the susceptible species of Euphorbia are annuals; the commonest is *E. pilulifera*. The author gives a distributional list of numerous other species.

Infection, though it may occur in any part, even in the unripe wall of the seed-capsule, is commonly localized in the individual plant—one branch may be infected and the next branch not. It is pathogenic to the affected part of the plant. The author mentions the experimental infection of plants by inoculation obtained by Noc and Stévenel; also the experimental infection of *Euphorbia sauliana* and *pilosa* with cultures of *Leptomonas ctenocephalus* of the dog-flea, effected by Laveran and Franchini. *Leptomonas davidi* is described and figured as it occurs in the plant, and also as it occurs in the insect-carrier, after the original account given by França. Lafont's discovery of a Leptomonas in the gut of a Lygaeid bug of the genus *Nysius* and his experimental transmission of the infection from the bug to a Euphorbia is mentioned, a discovery confirmed by Laveran and Franchini.

Leptomonas elmassiani and *bordasi*, discovered by Migone, in Paraguay, in the milky juice of the Asclepiads *Araujia angustifolia* and *Morrenia odorata* respectively, are mentioned. The first-named was subsequently noticed by Cordero in Uruguay, where it was associated with a bug, *Oncopeltus lactuosus*. *Leptomonas apocynae*, discovered by Franchini in two species of Apocynaceae, is noticed in a postscript.

The paper concludes with a bibliography.

A. A.

Franchini (G.). **Amibes et autres protozoaires de plantes à latex du Muséum de Paris. (Note préliminaire.)**— *Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 197–203.

The author has examined the juice of numerous plants in the Jardin des Plantes of Paris—mostly plants with a milky juice—and in a good many species he has found amoebae, and in some Flagellates also (Herpetomonas, Crithidia, and Trypanosoma). He succeeded in cultivating amoebae, from *Ficus carica* and two species of Strophanthus, upon horse-blood-agar (Nöller's medium), and observed the amoebae to have ingested red blood cells. He inoculated mice with juice of a Euphorbia containing trypanosomes; the inoculation was generally well tolerated, and in two mice he has up to the present found a single trypanosome. Among the parasites observed by him in plants were some resembling the debated forms lately figured by Mrs. Adie in the bed-bug believed to be infected with kala azar, and also some resembling Mrs. Adie's nematode-like forms.

The following is a list of the plants and their parasites :—

Euphorbiaceae : Trypanosomes in *Elaeophorbia drupifera*, *Euphorbia calyculata* and *Exoecaria emarginata* ; leishmaniform bodies in *Manihot dichotoma* ; amoebae in *Euphorbia verticillata* and *M. dichotoma*.

Asclepiadaceae : amoebae in *Chlorocodon whitei* and *Cryptostegia grandiflora* ; and crithidia also in the latter.

Apocynaceae : amoebae in four species of Strophanthus, in species of Acocanthera and Thevetia, in *Cerbera odollam* and *Caudrania javensis* ; and large trypansomes devoid of flagellum in the last.

Artocarpaceae : amoebae in *Ficus benjamina*, *F. pierrei*, *F. tholloni*, and *F. carica*, *Antiaris toxicaria* (Upas tree), and *Lakoocha artocarpus* ; trypanosomes in *F. benjamina* and leishmaniform bodies in *F. tholloni*.

Sapotaceae : amoebae in species of Chrysophyllum, Labramia, Tregulia, Mimusops, and Sideroxylon ; trypanosomes without flagellum in two species of Chrysophyllum ; herpetomonas in *Sideroxylon inerme* ; and flagellates of some sort in *Mimusops schimperi*.

Menispermaceae : small round or oval parasites in *Stephania rotunda*.

Anacardiaceae : a small round multinuclear parasite in *Oncocarpus vitiensis*.

A. A.

i. Franchini (G.). **Remarques à propos de la note de M. França sur la** *Flagellose des Euphorbes*.—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 205–207.

ii. ——. **Sur une amibe des figuiers de plein air de la région parisienne et sa culture.**—*Ibid.* May 10. No. 5. pp. 287–292. With 3 text figs.

iii. ——. **Flagellés et amibes d'une Urticacée exotique,** *Ficus parietalis*.—*Ibid.* June 14. No. 6. pp. 399–404. With 3 text figs.

i. Franchini, while admitting that the bug *Stenocephalus agilis* may be the intermediary of *Leptomonas davidi* in Portugal, gives reasons—with which Roubaud concurs—for assigning the part of intermediary to other species of bugs in other countries.

ii. In this paper an amoeba obtained from *Ficus carica*, a tree that grows in the open air in Paris, is described and figured. The amoeba could be found in cold, snowy weather. It can be cultivated in Nöller's horse-blood medium, and has a tendency to ingest the red blood cells. In its development a flagellar phase may be observed. The author thinks it probable that the trees are infected by the flies that swarm about the branches and fruit.

iii. Here are described and figured forms of Herpetomonas and trypanosome, and small bodies some of which have a leishmaniform appearance, from the fruit of *Ficus parietalis*, also various forms of crithidia and amoeba from the sap of the same plant. Some of the crithidia-forms are said to resemble the " nematode-like structures " mentioned by Mrs. Adie in her recent investigations into kala azar.

A. A.

França (C.). **Sur les flagellés parasites des latex (à propos de la note de M. Franchini).**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 408–410.

The author expresses the opinion that although *Stenocephalus agilis* may be the intermediary in infecting Euphorbias with *Leptomonas davidi* in Europe and North Africa, other Hemiptera may transmit the infection mechanically in other areas.

A. A.

Anigstein (Ludwik), with Raabe (H.). **Serological Researches on Protozoa.**—*Jl. Trop. Med. & Hyg.* 1922. Aug. 1. Vol. 25. No. 15. pp. 241-246.

The authors worked with a flagellate which they identified as *Bodo edax* Klebs, Kuhn. They found that the flagellate could be cultivated in enormous numbers on 1 per cent. agar plates covered with a thin layer of 1 per cent. peptone water (or of 5 per cent. broth), to which was added one drop of emulsion of a growth of water-bacteria on ordinary agar—the bacteria being essential to the nutrition of the Bodo. They immunized rabbits to mixed cultures of the Bodo and bacteria, and working with the immunized serum they did not find any lytic substance in it, but they found (1) that it agglutinated the Bodo in large agglomerations which retained collective movement, and (2) that it contained antibodies that fixed the complement in the presence of the Bodo, and also complement-fixatives against the bacteria with which the Bodo was cultivated. Inhibition of haemolysis was stronger in tubes containing the double antigen than in tubes containing only bacterial antigen.

A. A.

Nowlin (Nadine). **Correlation of the Life Cycle of a Parasite with the Metamorphosis of its Host.** *Jl. Parasit.* 1922. June. Vol. 8. No. 4. pp. 153–160. With 6 plates.

The gregarine of which the life-cycle is here described and figured is a new species, *Schneideria metamorphosa* (sic), parasitic in the fly, *Sciara coprophila*, and the several phases in the development of the parasite and host are stated to be reciprocally correlated. In the larva of the fly the young gregarine begins as an intracellular parasite, and emerges into the lumen of the gut as a monocystid. In the pupa the sporonts pair and begin to encyst and to segment. In the adult fly the formation of spores is completed and the preliminaries for production of sporozoites begin.

A. A.

Hill (G. F.). **Notes on the Habits and Distribution of Some North Australian Culicidae.**—*Commonwealth of Australia, Dept. of Health. Service Publication No. 21.* 32 pp. With 11 illustrations.

The Culicidae of this memoir number 34 species, including *Culex fatigans*, *Stegomyia fasciata* and two species of Anopheles, namely, *A. annulipes* and *A. barbirostris* var. *bancrofti*.

A. annulipes has a very wide range in Australia, and appears to be a most adaptable species, its larvae having been found in waters so diverse as brackish marshes, puddles and hoof-prints in fresh-water swamps, stagnant pools and hoof-prints in sandy creeks, grassy soakage, clear rock-pools with a current, margins of rapid streams, wells, irrigation-channels, and liquid-manure pits. It bites at any time of day and night, and cold, windy nights are not deterrent. Though there are seasonal oscillations, both adults and larvae can be found throughout the year.

The range of *A. barbirostris* seems to be limited to the coastal tracts of Queensland and the Northern Territory. Its larvae are usually found in grassy and weedy swamps, but have been noticed in a shallow well. It is seldom found in houses.

A. A.

Evans (Alwen M.). **Notes on Culicidae in Venezuela, with Descriptions of New Species. Part II.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 213–220. With 1 plate.

Description, based on a single female specimen, of a "new species" of Anopheles (*A. venezuelae*), which in a postscript is conjectured to be a variety of *A. punctimacula*.

A. A.

Root (Francis Metcalf). **Notes on Mosquitoes and other Blood-Sucking Flies from Porto-Rico.**—*Amer. Jl. Hyg.* Baltimore. 1922. July. Vol. 2. No. 4. pp. 394–405. With 5 text figs.

Includes a list of all the species of blood-sucking flies known to exist in the island of Porto Rico. The local species of Anopheles are *A. albimanus* and *A. grabhamii*.

A. A.

Waterston (J.). **Malaria in Macedonia, 1915-1919. Part V. Entomological Observations on Mosquitoes in Macedonia.**—*Jl. Roy. Army Med. Corps.* 1922. May. Vol. 38. No. 5. pp. 334–349.

These entomological observations relate to 28 species and two varieties of Culicidae. Six species and two varieties of Anopheles are included, namely, *A. maculipennis* and a variety, *A. bifurcatus*, *A. algeriensis*, *A. plumbeus*, *A. superpictus*, *A. "hyrcanus"* [better known as *sinensis*] and its variety *pseudopictus*. *Stegomyia fasciata* was common, but only in Salonica. *Culex fatigans* was not observed at all. The larva of a water-beetle—a species of Acilius—was observed to be very destructive to larvae, more particularly to those of Culicines.

A. A.

Edwards (F. W.). **A Synopsis of Adult Oriental Culicine (including Megarhinine and Sabethine) Mosquitoes. Part I.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 249–293. With 3 plates.

The Culicines of this paper include the Megarhines and the Sabethines.

This first instalment contains a key to the Oriental genera and keys to the Oriental species of the three genera Aëdes, Lutzia, and Culex; also descriptions and diagnoses of new Oriental species of these and other genera.

Further notice may be deferred until the rest of the paper appears.

A. A.

Edwards (F. W.). **Mosquito Notes. III.**—*Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 75–102. With 3 text figs.

A miscellany of notes and descriptions of mosquitoes from Paraguay, British Guiana, Nyasaland, India, Australia, New Guinea, and New Caledonia, including a taxonomic revision of the Ethiopian species of Culex, a confirmation of Theobald's Anopheline genus *Bironella*, a description of a new Aëdes (*A. woodi*) much resembling *Stegomyia fasciata*, and some corrections of the author's paper on Palaearctic Mosquitoes.

A. A.

Haworth (W. E.). [**Discovery of a New Breeding Place for Mosquitoes.**] [Correspondence.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June 22. Vol. 16. No. 3. p. 201.

The author has observed in Dar-es-Salaam mosquito larvae in the tops of coconut palms. Between January and June of the present year 1,673 palms produced 1,549 collections of larvae, among which *Culex fatigans* and *Stegomyia fasciata* were predominant, but among other species *Anopheles costalis* were recognized.

[In Samoa O'Connor observed *Stegomyia scutellaris* breeding in empty pods of the cocoa-tree (*Theobroma cacao*) still attached to the branches.]

A. A.

Marshall (John F.). **"Unofficial" Mosquito Control in England.**—*Science Progress.* 1922. Jan. Vol. 16. No. 63. pp. 462–468. With 1 plate.

——. **The Destruction of Mosquito Larvae in Salt or Brackish Water.**—*Hayling Mosquito Control. Circular No. 4.* 4 pp.

Hayling Island was divided into 18 administrative sections, each in charge of a secretary, and all possible breeding-places were charted.

A number of experiments with paraffin oil were carried out, but a larvicide considered to be more generally useful and less expensive was a liquid containing 15 per cent. of soluble cresol. This liquid in a dilution of 1 in 16,000 was found to kill larvae of *Ochlerotatus detritus* in one hour, in a dilution of 1 in 32,000 in an hour and a half, and in a dilution of 1 in 48,000 in three hours and a half. The volume of water in any given pond or channel is first calculated, and then the amount of cresol solution necessary to effect the required dilution. It was found possible to apply the cresol solution in an ordinary watering can having a rose.

A. A.

Sen (S. K.). **A Note on the Effects of Mercurous Chloride on Culicid Larvae.**—*Report of Proc. of 4th Entom. Meeting held at Pusa on the 7th to 12th Feb., 1921.* pp. 184–191. With 2 plates.

An exceedingly minute quantity of calomel in water—to be exact 0·001 gm. in 100 c.c.—is quickly fatal to larvae of *Stegomyia albopicta*, whereas a 0·001 per cent. solution of corrosive sublimate is not. "The pupae were generally unaffected."

How calomel acts is something of a mystery, since it is so very slightly soluble in water.

A. A.

Buxton (P. A.). **On Fish and Mosquitos in Palestine.**—*Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 203–204.

One of the greatest difficulties of antimosquito work in Palestine is a series of littoral swamps, the outlets of which are blocked by sand-dunes; and, besides, there exist other large marshy areas which can only be drained at excessive cost. In such circumstances the author has been at very great pains to discover whether the fishes

living in these swamps and marshes can be relied on for assistance. He has examined the stomachs of a large number of these fishes—several species of Cyprinodonts, a species of grey mullet, and a Tilapia—but in none of them were Culicid larvae found. On the other hand, by careful comparison in the field between isolated pockets of water and waters which little fishes could reach, he has collected some circumstantial evidence of the efficacy of *Cyprinodon calaritanus*, *C. sophiae* and *C. fasciatus*, and the young of *Tilapia zillii* against larvae of *Ochlerotatus caspius* and *Culex perexiguus*.

A. A.

Dubois (Raphaël). **Sur la destruction des moustiques par les anguilles et le repeuplement des cours d'eau, étangs, etc.**—*C.R. Acad. Sci.* 1922. Sept. 4. Vol. 175. No. 10. pp. 431–432.

The author speaks highly of the destructive powers of elvers against mosquito larvae.

A. A.

Miller (David). **A Remarkable Mosquito,** *Opifex fuscus*, **Hutton.**—*Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 115–126. With 24 text figs.

This remarkable New Zealand mosquito is found only on the coast of that country, and breeds in the rock-pools left by high tides. The adults themselves rest and trip on the surface of the pools. The eggs are laid, singly, on the rocks. The larvae are carnivorous; they can stay below water for a long time, browsing in the sandy bottom.

The insect, which was originally described as a Tipulid under the name of *Opifex fuscus*, is now—having been assigned to its proper place among mosquitoes by Mr. G. V. Hudson and also by Mr. F. W. Edwards—very fully described and figured in its larval, pupal, and adult stages by Mr. Miller, who considers that it should be separated as a distinct subfamily next to the Megarhini.

A. A.

Brug (S. L.) & de Rook (H.). *Bironella gracilis* **Theobald 1905.** (**Sous famille** *Anophelinae.*)—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 305–310. With 12 figs. in text.

The Anopheline genus, *Bironella*, and species *B. gracilis*, was founded by Theobald in 1905 on male insects from New Guinea. The authors have found adults and larvae of the species in plenty in virgin forest on the northern coast of New Guinea, the larvae in peaty bogs in the forest, and they now describe the female and larva and redescribe the male, figuring certain parts of each.

The species, which is characterized by the Uranotaenia-like brevity of the first fork-cell (second marginal), is confirmed in the Anopheline group. The female has comparatively short palps, varying in length from 60 to 67 per cent. the length of the proboscis. The male also has shortish palps (varying from 80 to 87 per cent. the length of the proboscis), and has genitalia of an uncommonly simple kind. The larva has a conspicuous plume near the middle of the inner aspect of the antennal shaft.

Though the authors' camp was near the forest, no Bironella was detected among the Anopheles that infested it.

A. A.

Lamborn (W. A.). **Some Problems of the Breeding-Places of the Anophelines of Malaya: A Contribution towards their Solution.**— *Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 1–23. With 1 text fig.

The main result of the judicious investigations here recorded in detail is to support the argument that in the matter of breeding-places the different species of Anopheles are selective to a remarkable degree, but that the selective tendency depends not so much on the obvious features of the environment, but rather, as Malcolm Watson has expressed it, on "something in the water." The author has concentrated on *A. aconitus*, the breeding-places of which he has subjected to prolonged and critical examination, and he comes at last to the conjectural conclusion that "some quality of the water strongly affects the distribution of *A. aconitus*, either directly or indirectly, by influencing the character of the food" of the larva.

The author appears to be in full agreement with Malcolm Watson as to the possibility of discovering some biological method of control over the dangerous species of Anopheles by influencing and altering the character of the water in which their larvae thrive. Such alteration may be brought about by altering the gross and obvious environment, as when the larvae of *A. umbrosus* disappear as their pools are deprived of shade; or by effecting some change in the composition of the water or of its alga-flora by subtler methods, as when the larvae of *A. maculatus* are observed to disappear with the spread of a felted alga that flourishes in water that is fouled in certain ways.

A. A.

Lamborn (W. A.). **The Bionomics of Some Malayan Anophelines.**— *Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 129–149. With 1 text fig.

Papers of this kind, consisting almost entirely of the detailed and very carefully qualified observations, experimental and other, of a highly competent and far-seeing observer cannot be abstracted; they have to be given in full. As this course is not practicable here, we must select a few conclusions of practical interest.

Everyone knows the difficulties of breeding-up Anopheles larvae in the workroom. The author at last discovered that all the open-country species could be brought up easily in polluted water containing an almost pure culture of Eugloena (probably *E. viridis*).

The reproductive capacity of Anophelines is another important subject upon which we here find several pages of exact statistics of egg-laying by captive females of several species. The maximum number of eggs obtained from a single female was as follows for each species: *A.* "*hyrcanus*" also called *sinensis*] 188, *A. barbirostris* 293, *A. maculatus* 300, *A. vagus* 273, *A. subpictus* var. *malayensis* [alias *A. rossi* Giles] 114, *A. karwari* 97, *A. ludlowi* 120, *A. aconitus* 117, *A. kochi* 110, *A. fuliginosus* 95, *A. tessellatus* 49.

Experiments as to the fate of eggs exposed to vicissitudes fill several pages. We can only show their drift, merely remarking that almost all the experiments were technically controlled. Some fresh laid eggs of *A. vagus* were transferred to moist mud and there left in a drying breeze for 48 hours, when water was added to float them off; none ever hatched. About 68 two-nights'-old eggs of *A. vagus* were allowed to dry; 24 hours afterwards 25 of them were replaced in water, and

in about 24 hours afterwards 14 larvae had hatched; the remaining 43 two-nights'-old eggs were allowed to dry for 48 hours before being restored to water, and 23 of them hatched. These experiments, showing that fresh eggs cannot endure drying, but that older eggs, in which embryonic development has made some progress, can retain their vitality for 72 hours when dried, were confirmed for other species besides *A. vagus*. Experiments showed also that fresh eggs, if placed on fairly moist filter paper guarded from evaporation, would produce larvae that lived all right when put into water.

With few exceptions the open-country Anophelines dropped their eggs between the hours of 8 p.m. and 6 a.m.

The length of larval life was found to vary even in the issue of eggs laid in the same day and of larvae kept under the same conditions—10–13 days for *A. tessellatus*, 10–14 days for *vagus* and *ludlowi*, 11–16 days for "*rossi*" and *kochi*, 12–17 days for *A. maculatus*, 19–31 days for *barbirostris*, etc.

Larvae taken from water soon succumbed even in a moist atmosphere, but pupae removed on blotting-paper and kept in a moist atmosphere survived and fulfilled their term without hurt or retardation.

Pupation generally took place during the night. The pupal term was always 36–48 hours.

Emergence also usually took place during the night. Of *A. vagus* 49 "families" were watched ["family" being used in the colloquial sense], and in "no single family was there marked inequality of sexes."

As regards the hook-filaments of the tail-tufts, some species of larvae were noticed to use them persistently, others only occasionally for attachment.

As regards natural enemies of Anopheles larvae. If, as is alleged, Chironomus larvae are hostile, it is more probable that they starve the Anopheles by using Anopheles food for their own larva-cases than that they openly attack the Anopheles. In certain ponds where Anopheles larvae were never found Belostomatid bugs and larvae of "Neuroptera" were particularly abundant.

A. A.

Swellengrebel (N. H.). **Tijdelijke en plaatselijke ophooping van *Anopheles maculipennis* om Amsterdam.** [Temporary and Local Accumulation of *Anopheles maculipennis* round Amsterdam.]—*Nederl. Tijdschr. v. Geneesk.* 1922. Vol. 66. 2nd Half. No. 4. pp. 350–359. With 2 text figs.

The following observations are of general interest:—Heavy shadow makes life impossible for the larvae of *Anopheles maculipennis*. High salt concentration seems harmful to the larvae, but artificially increasing it is impracticable as the ditches serve as watering places for the cattle. Narrow ditches are more suitable as breeding-places than broad ones. A distance of about two miles from the nearest house or stable does not prevent a pool becoming a breeding-place.

W. J. Bais.

Iltis (Hugo). **Ueber die Verbreitung der Malariamücken in Mähren und ueber die Gefahr einer Malariaendemie.** [The Range of Malarial Mosquitoes in Moravia and the Risk of Malaria becoming Endemic.]—29 pp. 1921. Brünn. Im Selbstverlage des Verfassers.

This is a very good article of a semi-popular kind. One of the best things in it is an aphorism of Ziemann: "Die Malaria ist cum grano salis eine Krankheit der Unkultur."

A. A.

Iyengar (M. O. Tirunarayana). **A Preliminary Note on New Thoracic Appendages in Anopheline Larvae.**—*Report of the Proc. of the 4th Entom. Meeting held at Pusa on the 7th to the 12th Feb., 1921.* pp. 216–217. With 1 plate.

What this observant author describes should hardly—unless by a transcendentalist who assumes wings and breathing-trumpets to be appendages—be called "appendages."

[The reviewer is ashamed to confess that he had never noticed the structures here described before, but he now finds them to be represented not only in full-grown Anopheles larvae, as the author has discovered, but also in full-grown larvae of Culex, Theobaldia, Stegomyia, Toxorhynchites, and Eretmapodites. They are not always easy to see, and when detected they are not always the prominent lobes described by the author. Examination of a considerable series of the "appendages" discovered by Mr. Iyengar shows them to be the beginnings of the breathing-trumpets of the prospective pupa.]

A. A.

Edwards (F. W.). **On Some Malayan and Other Species of *Culicoides*, with a Note on the Genus *Lasiohelea*.**—*Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 161–167. With 1 plate.

Culicoides sucking blood from an Anopheles distended with fresh human blood is a phenomenon that has been often observed and in several different places. In this paper is described and figured a Malayan *Culicoides anophelis* that has been seen making free in this way with individuals of no less than 11 species of Malayan Anopheles.

A. A.

Carment (A. G.). [**Report on Experiment of Fly Breeding from Stable Manure, with a Short Account of the Finding of a Parasite.**]—*Agric. Circular Fiji Dept. Agric.* Suva. 1922. Jan.–Mar. Vol. 3. No. 1. pp. 1–5. [Summarized in *Rev. Applied Entom.* 1922. Aug. Vol. 10. Ser. B. Pt. 8. p. 169.]

A parasitic Hymenopteron has been observed recently, in Fiji, attacking puparia of the house-fly. The Hymenopteron is present in the manure heap along with the maggots, but it does not become active until the heap begins to dry and the maggots have pupated. It is conjectured that an extraordinary reduction of house-flies that occurred in certain parts of Fiji some years ago may possibly have been due to this Hymenopterous parasite.

Some experiments made by this author showed that house-flies will travel against wind "evidently following a scent."

A. A.

Boyd (J. E. M.). **Entomological Notes: On a Muscid Fly Breeding on a Ship at Sea.**—*Jl. Roy. Army Med. Corps.* 1922. May. Vol. 38. No. 5. pp. 378–379.

During the voyage from England to India of a hired transport, flies—some undetermined species of Musca—were noticed to increase in numbers daily; and as the ship was not near land it was evident that they were bred on board, in fact a newly emerged individual

with wings still furled was actually caught, and one of the stewards said that the ship always carried what he called "sea-flies." On a previous voyage blue-bottles were seen, but this had been explained by a faulty refrigerator pipe. An outbreak of influenza cut the investigation of the origin of the Musca short. Nothing is said about the antecedents of the ship.

A. A.

KUHN (Philalethes). **Untersuchungen ueber die Fliegenplage in Deutschland.** [The Fly Plague in Germany.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. May 22. Vol. 88. No. 3. pp. 186–204. With 1 chart in text.

Between June, 1915, and May, 1917, inclusive, 532 dwelling-rooms and stables, etc., in Alsace and Baden were furnished with fly-paper (? tanglefoot) in order to subdue the plague of flies and to get some idea of its course. Altogether 49,426 fly-papers were used, and 4,359,658 house-flies and 282,202 stable-flies were caught. The number of house-flies caught in dwellings and in pig-sties was about the same—about half the numbers caught in byres and in stables. The stable-flies preferred byres, but were caught in dwellings within 200 metres of byres and cattle markets. The increase both of house-flies and of stable-flies in February, 1916, after an unusually warm December and January is taken as evidence that they can hatch out (*ausgeschlüpft sein konnen*) during winter. The plague of house-flies ran from April to October, with a maximum in August; that of stable-flies from June to November and December, with a maximum in September. Low temperatures seemed to retard development more in the stable-fly than the house-fly, though the adult stable-fly seems less sensitive to cold; the author thinks that *Empusa muscae* must have something to do with the earlier disappearance of the house-fly.

There is nothing very novel out of these laborious investigations.

A. A.

NOC. **Rôle des mouches en pathologie intestinale. Prophylaxie.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. Dec. Vol. 2. No. 10. pp. 280–283.

The author remarks that in the course of the year 1920 epidemics of bacillary and amoebic dysentery occurred at Senegal in synchrony with an unusual multiplication of flies, although amoeba cysts were not found in some flies captured at the hospital.

A. A.

KOBAYASHI (Harujiro). **On the Further Notes of the Overwintering of House Flies.**—*Japan Med. World.* 1922. July 15. Vol. 2. No. 7. pp. 193–196.

Ordinary house-flies (*Musca domestica*) captured in autumn in Seoul (Korea), placed in tubes, and fed on moist biscuit, lived more than five months, the temperature of the room being between 5° and 15° C. The flies were active, and some of them dropped their eggs. Males often lived as long as females. Other house-frequenting flies treated the same way at the same time died soon, except *Fannia canicularis*, which lived up to 106 days.

The author obtained no positive evidence of the hibernation of larvae or pupae of *Musca domestica*.

Other species that hibernate as adults in Seoul are *Muscina stabulans*, particularly the female; *Fannia canicularis* and *scalaris* (also in the pupa stage); *Calliphora lata* (may also breed in winter); Mesembrina sp., especially the female; *Scatophaga stercoraria*, and several species of Anthomyids.

Species that hibernate only as pupae in Seoul are Lucilia sp., Sarcophaga sp. and *Stomoxys calcitrans*.

Ophyra nigra hibernates in Seoul in the larva and pupa stages.

A. A.

Austen (E. E.). **The Prey of the Yellow Dung-Fly,** *Scatophaga stercoraria*, **L.**—*Ann. & Mag. Nat. Hist.* 1921. July. Ser. 9. Vol. 8. No. 43. pp. 118–123.

In a preface to a paper by G. S. Cotterell on the life-history and habits of this fly, published in the *Proc. Zool. Soc.* for December, 1920, Lefroy states that it is "a constant and general feeder on the common species of blow-fly in England throughout the season" and hopes that its services may be turned to practical use as a check on the blow-fly. It appears, however, that Lefroy's generalization was based on observations of flies in traps, where the captured dung-flies fed upon the captured blow-flies—a case of Hobson's choice.

Austen, without asserting any special predilection for the yellow dung-fly, claims the possession of ordinary powers of observation, and is so disquieted by the thought that in the course of upwards of thirty years he has never observed a blow-fly among dung-flies' victims in nature, that he here brings other observers—to wit Kirby and Spence, Poulton, A. H. Hamm, J. E. Collin, Colonel Yerbury, and Mr. Cotterell himself—on to the platform to reassure him. Some of these authorities can specify the small flies that have been seen on the field in the dung-fly's grasp; few of them have seen, most of them have never seen, a blow-fly among these victims. On these and other grounds the proposal to employ the dung-fly in the domestic service of man must be dismissed as illusive.

A. A.

Bezzi (M.). **On the Dipterous Genera** *Passeromyia* **and** *Ornithomusca*, **with Notes and Bibliography on the Non-Pupiparous Myiodaria Parasitic on Birds.**—*Parasitology.* 1922. Apr. Vol. 14. No. 1. pp. 29–46.

The strange fly *Carnus hemapterus*, which sucks the blood of nestling birds and passes its larval stages in the nests, was described by Nitzsch more than a century ago. Falcoz (Contribution à l'étude de la Faune des Microcavernes: Faune des terrier et des nids. Lyon) has drawn attention to the number of dipterous larvae found in bird-nests. The present paper, to which a comprehensive bibliography is attached, deals with several genera of flies—*not* belonging to the well-known pupiparous group—that are parasitic on birds, namely Passeromyia and Protacalliphora, which belong to the Calliphorine subfamily of the Muscidae; Philornis and Chortophila, which are referred to the Anthomyidae; and the Acalyptrate Muscids, Carnus and Neottiophilum.

Passeromyia is widely distributed in the warm zones of the Old World; its larvae are found in the nests of Passerine birds and suck the blood of the nestlings. Two species are here distinguished and correlated.

Protocalliphora occurs in Europe and North America (also Hawaii); the larvae have the same habits as those of Passeromyia. Three species are here systematically discussed. Of certain species, not here included, the larvae are said to be subcutaneous parasites of birds.

Philornis is Neotropical: the larvae are subcutaneous parasites of birds. Three species are here dealt with.

In the case of Carnus it is the adult fly that sucks blood while the larva lives in the bird's nest and is saprophagous. The adult fly has caducous wings (like the pupiparous Lipoptena). The only species known is European.

Of the two species of Chortophila one is European, the other North American; the larvae are found in bird-nests and probably live on the excrement.

One species of Neottiophilum is known, but only from Central Europe; "almost nothing is known about the larva," but living puparia have been found in nests of Passerine birds.

A. A.

Marzinowsky (E. J.). [**A New Species of Phlebotomus in Russia,** *Phlebotomus caucasicus* **sp. nov.**]—*Medicinskoye Obozreniye* (*Med. Review*). Moscow. Vol. 87. No. 13–16. 3 pp. With 2 plates.

The author describes a sand-fly caught by him in Tiflis (Trans-Caucasia) which he claims to be a new species—*Phlebotomus caucasicus*. It appears to be closely allied to *P. sergenti* recently described by Parrot from Algiers, but differs from it in the structure of the antennae, the genital apparatus and other minor features.

C. A. Hoare.

Dawe (M. T.). **Efwatakala Grass** (*Melinis minutiflora*) **as a Means for the Control of the Tsetse-Fly.**—*Tropical Life.* 1922. May. 8 pp. With 1 fig.

Efwatakala grass (*Melinis minutiflora*) is widely distributed in Africa, from south of Sahara to Natal; it is also cultivated extensively in South America as pasture, being known in Brazil as *gordura* (= fat grass) and *capim mellado* (= honey grass). *Eftwatakala* is its name in the Congo language, but in other parts of the Congo country it is known variously as *Ickamboma, sala, ngonosch tutubia.*

This grass has a strong odour, and its leaves are covered with glandular hairs containing a viscid oil. In Portuguese Congo it is used for repelling fleas from sitting hens and littering dogs; and in other parts for stopping fermentation in palm-wine. In Brazil and Colombia it is believed that ticks cannot live in *gordura* pastures, and that Dermatobia is disappearing before it. For all these reasons the author thinks that it should be cultivated as a defence against tsetse-flies and mosquitoes. It grows in moist lowlands as well as on dry hill tops. If the bush were cleared and planted with this grass the grass would hold its own, for in the coffee plantations of Brazil "capim mellado is often sown in order to stifle certain weeds; so thickly does it mat on the surface that the most stubborn of them is ousted."

The author does not seem to have made any experiments on his own account.

A. A.

Journal of the Department of Agriculture. Union of S. Africa. Pretoria. 1922. Apr. Vol. 4. No. 4. pp. 303–304.—**Tsetse Fly Studies.**

Records the discovery, in Zululand, by Mr. R. H. Harris, of breeding grounds of *Glossina pallidipes*; all were in dry, sandy loam, rich in humus, near drinking-places, associated (in every case but one) with a low bush called *umkukuti* in the vernacular, and not in heavy forest; pupae were never found under logs, or about roots or trunks of trees.

From some small experiments of his own Mr. Harris has faith in burning, not in any hope of destroying pupae, but to deprive the fly of necessary shade. The burning would have to be repeated for some years. He also approves of reducing the amount of game.

A. A.

Ferris (G. F.) & Cole (F. R.). **A Contribution to the Knowledge of the *Hippoboscidae* (Diptera Pupipara).**—*Parasitology.* 1922. June. Vol. 14. No. 2. pp. 178–205. With 20 text figs.

The authors' observations have been made on specimens prepared by a method which, though not generally in favour with entomologists, is well known to give most instructive results, namely, clearing and then mounting in balsam, after having first softened the specimen in 10 per cent. KHO solution and then cleaned and washed and dehydrated it. [For small Diptera, fixed in alcohol, softening with KHO is not necessary, of course.]

The paper is distinguished by its ingenious and magnificently-executed figures.

A. A.

Patton (W. S.). **Some Notes on Indian Calliphorinae. Part VI. How to recognize the Indian Myiasis-producing Flies and their Larvae, together with Some Notes on how to Breed them and Study their Habits. VII. Additional Cases of *Chrysomyia bezziana* Vill., together with Some Notes on the Diptera which cause Myiasis in Man and Animals.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 635–653. With 10 figs. & 2 plates. pp. 654–682.

In this paper the author continues his account of the species responsible for myiasis in man and domestic animals. The first part of the paper deals once more with *Chrysomyia bezziana*, a species previously known only from tropical Africa as a pest of animals, but which the author has discovered to be extremely common in India and considers to be, in its larval stage, a true parasite of man also, always laying its eggs (when it selects man) in sores or discharges, or at some of the natural orifices of the body—urinary meatus possibly excepted—when these happen to be in an "attractive" condition. Rovere, in Africa, observed it laying its eggs on the intact skin of cattle, but the author does not approve of this as a normal habit. Riley, in India, states that he grew the larvae on decomposing meat, but the author doubts the statement. The author here gives brief abstracts of 35 more cases of human myiasis and 61 more of myiasis in animals due to the maggots of this species, the cases being from all parts of India. In the human cases the maggots (or pupae) were found in ulcers and sores of various kinds in various parts of the body, also in the mouth, nose, ear, orbit, and vagina. The author has never observed the adult fly in bazaars or in houses, and thinks that it must feed on flowers.

In the second part of the paper the species causing myiasis are catalogued as (1) "Specific Myiasis-producing Flies," or flies like the Oestridae, *Chrysomyia bezziana*, and others, that deposit their eggs only in living tissues, so that in the larval stage they are true parasites; (2) "Semi-specific Myiasis-producing Flies," or species that normally lay their eggs in garbage of various kinds but occasionally in wounds, etc., so that in the larval stage individuals may sometimes be fortuitously parasitic; and (3) "Accidental Myiasis-producing Flies," or species of which the eggs or larvae may be swallowed accidentally in food or drink and the larvae may subsequently make themselves at home in the human intestine. In the account of the Oestridae a fatal case of infestation with *Cobboldia elephantis* is mentioned where the maggots were so numerous in the stomach of a young elephant that, in the words of the observer, "there was no room for a pin to pass through the stomach." The paper concludes with some remarks on the prevention and control of the flies under discussion. Here the author lays great stress on a popular application of technical education.

A. A.

Patton (W. S.). **Notes on the Calliphorinae. Part I. The Oriental Species.**—*Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 109–113.

This paper, besides dealing critically with the synonymy, contains valuable summaries of the distribution, habits, and breeding preferences of Oriental Calliphorines; six species of Chrysomyia, five of Lucilia, and one Calliphora are included in the catalogue.

A. A.

Toomey (Noxon). **Hypodermiasis (Ox-Warble Disease).**—*Brit. Jl. Dermat. & Syph.* 1922. Feb. Vol. 34. No. 2. (No. 400.) pp. 31–42. With 8 text figs.

The aim of this paper is to emphasize the difference between the skin-lesions caused by larvae of the warble-fly, Hypoderma—three species of which, namely *H. bovis* (W. Europe, Canada, and northern United States), *H. lineata* (United States), and *H. diana* (S.E. Europe) are known to attack men—and those caused by larvae of the bot-fly, Gastrophilus. In the case of Hypoderma there are subacute outbreaks of inflammation of the *subcutaneous* connective tissue at the point of entry and along the course taken by the larva in its wanderings, and finally when the larva comes to rest there is the warble or indolent boil—indistinguishable from an ordinary boil except for the central breath-hole and the sensation of *ballotement*—commencing in the corium and spreading to the epidermis.

A. A.

Greig (David M.). **Myiasis oestrosa: being the Occurrence in the Human Subject of the Larva of *Hypoderma bovis*. A Vindication of Edinburgh's Priority of Recognition.**—*Edinburgh Med. Jl.* 1922. June. New Series. Vol. 28. No. 6. pp. 258–266.

The author in recording a case of cutaneous myiasis in a child, due to *Hypoderma bovis*, refers to some other cases of the same sort, and claims that the first three on record were reported in 1848 to the University of Edinburgh by Dr. G. W. Spence, of Lerwick, who stated that they occurred in 1818 in the practice of his father in the same place.

A. A.

Patton (W. S.). **Notes on Some Indian Aphiochaetae.** *Aphiochaeta xanthina*, **Speiser** (*repleta*, **Schmitz**; *circumsetosa*, **de Meijere**; *ferruginea*, **Brunetti**), **whose Larvae cause Cutaneous and Intestinal Myiasis in Man and Animals, and** *Aphiochaeta rufipes*, **Meigen, whose Larvae occasionally cause Cutaneous Myiasis in Animals.** — *Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 683–691. With 1 plate.

The egg, full-grown larva, pupa and adults of *Apiochaeta xanthina* Speiser (= *ferruginea*, Brunetti) and *A. rufipes* are here described and figured. The former has long been known as of accidental occurrence in the intestine of man; the author has bred it from faeces of animals, and from decaying meat, and has also encountered it in sores, etc.; he gives short abstracts of its occurrence in two cases of ulceration in man and three in cattle, and also of the occurrence of *A. rufipes* in sores in cattle in two cases.

A. xanthina bred artificially in tubes lived, the males not more than a week, the females about a month. Females laid from 218 to 344 eggs. The eggs hatched in 28–36 hours. The developmental term, from egg to adult stage, occupied from 21–27 days.

A. A.

Ingram (A.). *Aphiochaeta xanthina*, **Speiser** (*A. ferruginea*, **Brun.**) **as an Intestinal Parasite in the Gold Coast.**— *Jl. Trop. Med. & Hyg.* 1922. May 1. Vol. 25. No. 9. pp. 113–115.

Apiochaeta xanthina, Speiser (= *ferruginea*, Brunetti) has been recorded from West Africa, but not—until the present case—as an intestinal parasite of man there. A specimen of faeces containing puparia was left in five per cent. formalin overnight, and in the morning the pupae, being found to be alive, were removed, washed, and dried, with the result that in due time the flies issued unharmed. Some of the flies were confined along with a piece of raw meat, and next day eggs were found; the next day after, larvae were seen; five days after that, pupation had begun, and the following day all had pupated; finally, on the fifteenth day after the first appearance of the eggs, five adult flies hatched out. It was observed that pupae could not withstand desiccation.

The patient from whom the faeces containing the original puparia came was badly anasarcous, had eggs of *Bilharzia* in her urine, and eggs of *Ascaris lumbricoides* in her faeces, and ultimately she died, so that it is hard to judge what part—if any—*Apiochaeta xanthina* had contributed to her condition. In another case of infestation by this fly, reported by the same observer, Dr. G. E. H. Le Fanu, the patient did not show any symptoms suggestive of beriberi.

A. A.

Patton (W. S.). **Note on the Occurrence of the Larvae of** *Philaematomyia crassirostris*, **Stein, in the Human Intestine.**— *Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 57–59.

Philaematomyia crassirostris, a bloodsucking Muscid fly, has been carefully studied by Patton and Cragg, who have never known it to lay its eggs in anything but fresh cow dung; but, as the author

points out, the occurrence of its larvae in the intestine of a Hindu patient is not altogether surprising if it be remembered that in the Hindu ceremony of purification the five products of the cow—one of which is the animal's dung—are mixed and eaten.

The patient in the present case is stated to have been passing threadworms for eight years and dipterous larvae for six, and he was also heavily infected with *Ancylostoma duodenale*. He received two courses of thymol for the last, and was cured, but he still continued to pass dipterous larvae. Successive specimens containing these larvae have been examined by the author, who has specifically identified them, not merely by inspection, but by securing the pupal and adult stages. One specimen sent to the author also contained an egg of the species as well as two larvae of a Sarcophaga.

A. A.

Loughnan (W. F. M.). **Notes on a Case of Myiasis.**—*Jl. Roy. Army Med. Corps.* 1922. June. Vol. 38. No. 6. p. 458.

A case of infestation with larvae of Dermatobia, which occurred at Belize in British Honduras in the practice of a local doctor. A tobacco leaf gummed over the inflamed sites stopped the pain immediately, and when the leaf was removed eight hours afterwards the larva could be squeezed out.

A. A.

Gabrielides (A.) & Guiart (J.). **Myiase oculaire à *Oestrus ovis* à Constantinople.**—*Paris Méd.* 1922. Mar. Vol. 12. No. 12. pp. 249–250. With 2 text figs.

In this case the patient came for treatment eight hours after, as he thought, a foreign body had got into his eye. There had been slight and transitory pain which had returned about five hours afterwards. On examination several small larvae were seen crawling on the conjunctiva. These were removed under 4 per cent. novocaine, the action of which they resisted for 20 minutes. The larvae, 14 in number, were identified as *Oestrus ovis* of the first stage.

A. A.

Dartigolles (R.). **Un cas de Myiase nasale en Guinée.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. p. 416.

The maggots, which proved to be *Pycnosoma* (*Chrysomyia*) *putorium*, were lodged under the right cheek, and were observed in muco-purulent fluid escaping from the nose. They were washed out first with boiled water, then with menthol water, and finally with iodine water.

A. A.

Patton (W. S.). **Notes on Two Cases of Cutaneous Myiasis caused by the Larvae of *Sarcophaga* sp.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 60–62. With 1 text fig.

These two cases occurred in the Jubilee Hospital, Nellore, Madras Presidency. In both cases the larvae of species of Sarcophaga were removed from abscesses, and in one case it is believed that the larvae were deposited in the abscess after it had been opened.

A. A.

DA MATTA (Alfredo). **Perturbaçoes mentaes produzidas por naso-buco myiase com perfuração do veu do paladar.** [Mental Disturbance produced by Naso-Buccal Myiasis with Perforation of the Velum palati.]—*Brazil-Medico.* 1921. Oct. 15. Year 35. Vol. 2. No. 14. pp. 195–197.

The patient, a day labourer aged 28, came under treatment complaining of a feeling of weight in the head, mental confusion and periodical attacks of intolerable pain. The attacks were accompanied by prostration and vertigo and there was throughout intense mental irritability. Other symptoms noticed were coryza, itching of the nasal fossae, slight epistaxis, hoarseness and a burning sensation in the throat. Temperature 102° F. The patient's condition grew steadily worse in spite of local and constitutional treatment. On the fourth day after admission a nurse drew the author's attention to a larva which he had found on the patient's lips. A careful examination was made of the mouth and nasal fossae and a similar larva was found on the tongue. They appeared to have issued from a small orifice on the soft palate. During the next two days three more orifices appeared on the palate and from them issued 17 larvae. All symptoms rapidly disappeared and the patient was discharged well on the 17th day. The larvae were identified as those of *Chrysomyia macellaria*, F. The patient was in the habit of falling asleep under trees during his mid-day rest and it was probably on one of these occasions that the fly laid its eggs in the nostril. The author refers to an article on the subject by W. de ALMEIDA, of Rio—"Mental Disturbance in the Course of Nasal Myiasis" (*Arch. Brasileiros de Med.*, 1917, No. 4).

F. S. Arnold.

PATTON (W. S.). **Note on the Egg-laying Habits of *Cobboldia elephantis*, Cobbold.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 63–65. With 1 text fig.

The author understands from good authority that the Indian elephant-bot, *Cobboldia elephantis*, may sometimes cause the death of its host. He has received third-stage larvae taken from the stomach of an elephant calf, in which they were so packed as not to leave room for a pin to pass. As in the case of *Cobboldia loxodontis* of the African elephant, observed by RODHAIN and BEQUAERT, the eggs of *Cobboldia elephantis* are laid in packets at the base of the tusks, and the larvae on hatching are believed to find their way to the stomach through the mouth. The author found that when an egg-packet was placed in water, as might happen when an elephant is drinking (or in salivation), the eggs split and the larvae emerged with remarkable activity. Observers are requested to pay attention to the bot-flies of the Indian elephant, as their habits are not sufficiently known and their larvae are obviously a serious pest of the elephant.

A. A.

SENIOR-WHITE (R. A.) & SEN (S. K.). **Further Notes on the Occurrence of Coleoptera in the Human Intestine.**—*Report of Proc. of 4th Entom. Meeting held at Pusa on the 7th to 12th Feb., 1921.* pp. 236–239.

The object of this note is to draw the attention of medical men to the subject in order that exact observations may be made and recorded as opportunity occurs.

A. A.

Erickson (William J.). **A Case of Larvae in the Male Urethra.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 22. Vol. 78. No. 16. p. 1201.

Several small larvae were squeezed from the urethra of a male patient who complained of intense local itching. The larvae could not be identified, and "the mode of implantation and the species of larva remain a mystery."

A. A.

Delanoe (P.). **Le mouton piège à puces.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 416–418.

The best trap for fleas, according to the author, is a living sheep. The fleece of the sheep with its natural grease suffocates fleas as effectually as a bath of oil.

A. A.

Kenya Colony. **Report on the Identification of Fleas collected by Mr. W. N. van Someren in Kenya Colony (Kavirondo District) during Plague Survey, and submitted to the Director, Imperial Bureau of Entomology, by Mr. T. J. Anderson, Government Entomologist. I. 1922.** [MS. received from Colonial Office.]

Echidnophaga gallinacea, on rat and domestic fowls. *Dermatophilus penetrans*, from native huts. *Xenopsylla brasiliensis*, on *Rattus* (*Mastomys*) *coucha ugandae*.

A. A.

Riley (William A.). **The Reputed Vesicating Properties of the Granary Weevil,** *Calendra granaria.*—*New Orleans Med. & Surg. Jl.* 1922. Apr. Vol. 74. No. 10. pp. 678–682.

One of the author's graduate students, Miss Florence Defiel, has proved, by careful experiments, that the weevil, *Calandra granaria*, does not possess the vesicating properties that have been attributed to it. The author also himself partook of a dose of more than half a gramme of the powdered weevil, on an empty stomach, without any ill-effects.

A. A.

Defiel (Florence). **An Experimental Investigation of the Supposed Poisonous Qualities of the Granary Weevil,** *Calendra granaria.*—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 199–211.

From varied experiments on rodents, chickens, frogs, and on the human skin, the author "considers it justifiable to conclude that the granary weevil contains no cantharidin and cannot be used as a substitute for the blister-beetle, nor is there any evidence to indicate that it is responsible for cases of poisonous flour." As the author points out, these conclusions, though not congruent with often-repeated uncritical statements, are in agreement with those published by Henry and Bonastre in 1827. A list of 29 pertinent references to the subject is given.

A. A.

Bequaert (J.). **A propos des Staphylinides vésicants du Bas-Congo.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 227–229.

The Staphylinid beetle described by Rodhain and Houssian as causing a vesiculous dermatitis in Congo has been identified as *Paederus sabaeus*, a species distributed all over the Ethiopian zoogeographical region. The genus *Paederus*, which is cosmopolitan in range, is very numerous in species, and many, if not all of them, have vesicant

properties. The following species are notorious in this respect: in Africa, *P. sabaeus* and *P. crebripunctatus*; in Asia (Java), *P. peregrinus*; in S. America, *P. amazonicus*, *P. columbinus* and *P. goeldii*; in S. Russia (Astrakhan), *P. fuscipes*. Two other European species, *P. limnophilus* and *P. gemellus*, have been shown experimentally to be blister beetles.

A. A.

Loir (A.) & Legangneux (H.). **Accidents de travail occasionnés par des coléoptères.**—*Bull. Acad. Méd.* 1922. July 18. 3rd Ser. Vol. 88. No. 29. pp. 68–72.

Labourers employed in discharging an offensive cargo of bones suffered severely from itching of the skin, vesiculous conjunctivitis, irritation of the respiratory tract, and nausea.

The symptoms were found to be caused by the larvae of Dermestes, which were present in such enormous numbers that their hairs filled the air with a fine powder on the slightest movement.

A. A.

Foot (Nathan Chandler). **Pathology of the Dermatitis caused by *Megalopyge opercularis*, a Texan Caterpillar.**—*Jl. Experim. Med.* 1922. May 1. Vol. 35. No. 5. pp. 737–753. With 2 plates.

Megalopyge opercularis, the slug-like but hairy larva of which is known in Texas as the puss-caterpillar, opossum bug, Italian asp, and by Mexicans as *el perrito*, causes by its hairs a painful, burning, vesicular dermatitis, sometimes also extensive swelling, and numbness; in the case of children there may, in addition, be fever, restlessness or mild spasms, nausea and vomiting. The hairs [like those of some African species of Anaphe] are hollow and have a bulbous base or poison-sack.

The hairs of the larva of *M. opercularis* and the tubercles to which they are attached are described and figured; they contain a venom which appears to be stored in the bulb. The toxin is destroyed by boiling; its virulence decreases when the caterpillar has spun its cocoon, and is lost after death.

A list of families and genera of moths of which the hairy or spiny caterpillars have stinging effects is also given. It does not profess to be complete. The families mentioned are the Megalopygidae, the Cochlidiidae (= Limacodidae), of which the caterpillars also are slug-like and hairy, the Thaumatopoeidae (= Eupterotidae), to which the processionary-caterpillars belong, the Lasiocampidae (eggar and lappet-moths), the Liparidae (= Lymantriidae, browntail and gypsy-moth family), the Arctiidae (tiger-moth family with "woolly-bear" caterpillars), the Saturniidae and Hemileucidae (tusser-silk moth families).

A. A.

Knight (Harry H.). **Observations on the Poisonous Nature of the White-Marked Tussock-Moth (*Hemerocampa leucostigma* Smith and Abbot).**—*Jl. Parasit.* 1922. Mar. Vol. 8. No. 3. pp. 133–135.

The author and some friends have had vivid experience of the irritant effects of the hairs of the cocoons (and the dorsal tufts of the larva) of the Liparid moth, *Hemerocampa* (= *Orgyia*) *leucostigma*—namely, itching and burning within a few minutes of contact, followed

by swelling which continued painful for several hours, and succeeded, after subsidence of swelling and pain, by red spots lasting to the third day. In the case of the person who collected the cocoons, there was some fever. There is some ground for supposing that the venom may not be developed until the larva is nearly full grown; a half-grown larva "failed to react as did seven or eight mature caterpillars."

A. A.

Hashimoto (T.) & Hagiwara (H.). **Ueber den giftigen Nachtschmetterling (*Euproctis frava* Bremmer) und die dadurch verursachte Dermatitis.** [In Japanese. German Summary, pp. 51–52.]—*Japan. Ztschr. f. Dermat. u. Urol.* 1922. June. Vol. 22. No. 6. pp. 475–491. With 6 text figs.

Acute dermatitis caused by the scales of the moth *Euproctis frava* occurs in epidemics in Japan. The author did not succeed in any method of extracting a poison, and agrees that the irritation is caused mechanically.

A. A.

i. Rodhain (J.). **La subsistance de l'*Ornithodorus Moubata* sur des reptiles et des sauriens.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 560–564.

ii. ——. **L'ubiquisme parasitaire de l'*Ornithodorus Moubata* peut-il influer sur son infection par le spirochète de Dutton?**—*Ibid.* pp. 564–565.

i. The experiments here recorded show that the nymphs of *Ornithodorus moubata* can live quite as well on the blood of a viper (Causus) or a true lizard (Gerrhosaurus and Hemidactylus) as on that of a mammal, but that the blood of the chameleon is difficult for them to digest, toxic, and often fatal. Young ticks of this species, however, die in greater numbers when given successive feeds on the viper than when fed on a mammal (guinea-pig or rat). Though the blood of the chameleon is indigestible and toxic at a first feed, it seems possible that those ticks that survive a first feed can subsequently become habituated to chameleon blood.

ii. An *Ornithodorus moubata* habituated from its earliest nymph stage to chameleon blood was not thereby precluded from becoming infected and infective when finally fed upon a mouse having *Spirochaeta duttoni* in its blood.

A. A.

Cunliffe (Norman). **Some Observations on the Biology and Structure of *Ornithodorus savignyi*, Andouin.**—*Parasitology.* 1922. Apr. Vol. 14. No. 1. pp. 17–26. With 3 text figs.

This is a companion paper to one by the same author [see this *Bulletin*, Vol. 19, p. 492] on *O. moubata*.

Under laboratory conditions the biology is much the same in both species. The changes in external anatomy undergone during development are similar to those already described for *O. moubata*. Reproduction was inhibited at 37° C. Moisture is unfavourable at every stage of growth. Parthenogenesis does not occur. A female may produce over 400 eggs, of which at least 60 per cent. may be fertile.

A. A.

Delanoë (P.). **Au sujet d'***Ornithodorus marocanus*, **Velu, 1919.** — *Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 418–420.

Ornithodorus marocanus, Velu, has been found by the author in Doukala and Oualidia (Cape Blanc) in pig-styes and in moist, sandy soil beneath fallen palm-leaves. Its bite may be fatal to young pigs, but does not seem to do much harm to man, since a shepherd, who in one night received so many bites that he resembled a case of haemorrhagic smallpox, suffered nothing more than attacks of malaise for 24 to 36 hours and intolerable itching for a few days.

A. A.

Brumpt (E.) & Larrousse (F.). **Transmission de la Piroplasmose canine française par le** *Dermacentor venustus*. — *Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 540–545. With 1 text fig.

Transmission of canine piroplasmosis was demonstrated by Launsbury, in Africa, for *Haemaphysalis leachi*; then by Christophers, in India, and by Brumpt, in Tunisia, for *Rhipicephalus sanguineus*; then by Brumpt for *Dermacentor reticulatus*: the present paper contains an account of its experimental transmission by means of *Dermacentor venustus*. In this, as in all the other species named, the infection acquired by the adult tick is transmitted to the next generation, but becomes evident only when that generation becomes adult. The transmission through the intervening larva and nymph stage is not affected, even when the larva and nymph are fed on animals refractory to the infection.

A. A.

Pusa. **Report of the Proceedings of the Fourth Entomological Meeting held at Pusa, 7th to 12th February, 1921.** [Edited by Fletcher (T. Bainbrigge).]—pp. xii + 401. With 57 plates. 1921. Calcutta: Supt. Govt. Printing, India. [Price Rs. 7 As. 8.]

The meetings of which the proceedings are here set forth were attended by 41 entomologists, and among the visitors who participated was Professor Poulton, of Oxford. Fifty-one papers of varied interest were read and discussed, and 50 of them are now published in this report: nine of them come into the medical and veterinary purview and have already been noticed in the *Bulletins* of this Bureau. But besides the papers of a purely economic and technical import there are several that treat of things of general interest, like life-history and bionomy; these, together with the chairman's opening address, which contains some lively touches of humour, supply salt and savour to the plainer entomological fare.

No apology is necessary for drawing attention to the chairman's (Mr. Bainbrigge Fletcher) special contribution, entitled "Koenig's Paper on South Indian Termites." This paper, published in 1779, "has remained in oblivion all too long," and general thanks are due to Mr. Fletcher for having translated it and republished it here.

A. A.

Patton (W. S.). **Note on the Value of a Tame Cow for collecting the Blood-sucking Diptera of a Locality.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 66–68.

The author, in India, has been accustomed to use now a tame cow, now a tame bull, for attracting blood-sucking flies. The animal must be docile or it will object to being flicked with a net or prodded with a test-tube.

A. A.

de Mello (Froilano) & Correa Afonso (P.). **First Entomological Records in Portuguese India.**—Reprinted from *Report of the Proc. of the Fourth Entom. Meeting held at Pusa, 1921.* pp. 43–48.

This paper contains a list of such insects of economic importance as have been identified up to the present in Portuguese India—chiefly insects predacious and parasitic on man, but also a few pests of growing crops and of stored grain. The authors began to make observations on this important subject six years ago, but they complain that their labours have not hitherto received a very warm official acknowledgment.

A. A.

Louis (D. J.). **Black Spider Poisoning. Report of Four Cases.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 8. Vol. 76. No. 2. p. 99. [Received Oct. 17, 1922.]

The bite of the Mexican "black spider" (black with a few white spots on the body) causes immediately a pustular eruption, which is followed by much oedema and spreading lymphangitis and lymphadenitis. In addition to severe pain there is nausea, vomiting, restlessness, and slight fever. The disabling consequences of the bite may last from four to ten days. Magnesium sulphate, locally and internally, is recommended as the basis of treatment.

A. A.

Vlok (A. M.). **Fatal Case of a Scorpion Bite.**—*S. African Med. Rec.* 1922. Sept. 23. Vol. 20. No. 18. pp. 354–355.

Records the death of "a strapping lad" of eighteen, and of his dog, following stings from a single scorpion. The youth was seen about seven hours after the accident; there were two punctures on his forefinger, he was in a clammy sweat, complained of a feeling of suffocation, and had difficulty of breathing and great difficulty in swallowing; he was quite conscious, and did not complain of pain. Coarse moist sounds were heard all over the chest, the heart sounds were very weak, and the pulse was soft and bounding. Some viscid blood-stained mucus was coughed up. After treatment with hot-water applications and a hypodermic injection of strychnine the patient felt better, but some hours later he collapsed and died. The dog was found dead about 200 yards from the scene of the accident. The scorpion was not seen by anybody but the youth himself, who made the ambiguous statement that it was suspended from his forefinger by its two "claws"; the state of collapse in which he was first seen by the author was said to have followed five minutes after the scorpion's attack.

A. A.

Kraus (R.). **Estudos sobre os venenos das glandulas das cobras opisthoglyphas e aglyphas Brazilieras.** [Studies on the Poison Glands of Brazilian Cobras.]—*Brazil Medico.* 1922. June 3. Year 36. Vol. 1. No. 22. pp. 283–285.

This article, which is spoken of as a first communication, is divided into two parts; (1) The venom of Brazilian Opisthoglypha; (2) The toxicity of certain glands of the Aglypha.

Attention is first directed to two previous publications from the "Instituto de Butantan," the one by Dr. de C. Penteado on a histological study of the glands of certain species of Opisthoglypha, Aglypha, and a constrictor [see this *Bulletin*, Vol. 17, p. 128], the second by Dr. Naur Martins on the venom of Brazilian Opisthoglypha, especially *Philodryas schotti* and *Erythrolampus aesculapius*. The article under review comprises the results of a further study of the latter question.

In the first series of experiments the venom was extracted by trituration of the fresh gland with normal saline and subsequent centrifugation. Thus obtained it is a viscid, milky fluid with a powerful proteolytic action, markedly coagulant but weakly haemolytic. Injected intravenously into pigeons and rabbits it acts on the central nervous system, producing paralysis with convulsions. 0·5–1 cc. killed the animals in a few minutes, 0·25 cc. in a few hours. 1 cc. intraperitoneally caused death in a guinea-pig in a few hours and, subcutaneously, in 24 hours with local necrosis. Blood taken from the heart after death remained fluid in vitro. The venom retained its activity after drying for several months; that of *Philodryas schotti* was destroyed by a temperature of 70° C. An antivenene was obtained but it neutralized only two lethal doses of the venom.

For the second series of experiments the glands (of *Drymobius bifossatus*) were emulsified in saline and the extract filtered and centrifuged. 0·3 cc. injected intravenously killed pigeons in 5 minutes and rabbits (500 gm. weight) in 10 minutes; intramuscularly, 0·5 cc. caused death in the former in 40 minutes, in each case with paralysis and respiratory embarrassment. The action of the venom was not destroyed by heating to 80° C. When dried, 5 mgm. caused death in a rabbit in 22 minutes [method of administration not stated].

All the above results were produced with extract of the superior labial gland; that from the rostral gland proved negative. The blood of animals killed by this venom coagulated readily. An antiserum prepared against this proved ineffectual even against two lethal doses.

The author concludes by saying that a division of Colubrids into venomous and non-venomous species is without scientific foundation since they all possess poison glands with toxic secretions and that they play a part in normal digestion.

H. Harold Scott.

Crolly (V. St. John). **Cobra Bite.** [Correspondence.]—*Brit. Med. Jl.* 1922. June 17. p. 951.

——. **Notes on a Case of Recovery from the Bite of a Cobra.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 57–60.

The report of this instructive case is best given in the author's own words. It may, however, be doubted whether a tourniquet applied to the forearm was of much effect.

"A young Anglo-Indian employee of the Bengal-Nagpur Railway had recently captured a female cobra (*Naia tripudians*) 4 ft. 6 in. long, and on May 24th, 1921, was exhibiting it to some friends of his, when it suddenly bit him twice on the dorsal surface of his right wrist, at about 8.45 a.m. A string and handkerchief were tied tightly above the bite, and he was brought to hospital, where he was seen about 9 a.m. A rubber tourniquet was applied tightly round the forearm, and gold chloride was injected subcutaneously around the bites after they had been incised. The patient was placed in bed in hospital and two injections of antivenene, 20 c. cm. each, were administered under the skin of the abdominal wall. He was suffering agony from the constriction of the ligature and tourniquet, and the arm was getting considerably swollen. The ligatures were removed about 10 a.m., much to his relief, and I warned the nurse on duty to let me know as soon as he presented any untoward symptom. At 10.55 a.m. it was reported that he was restless and said he could not see. On examination I found that he had complete ptosis of both eyelids, he was bringing up a considerable amount of sticky saliva and mucus from his mouth, and his speech was becoming slurred. I immediately ordered antivenene to be injected intravenously, and this was done at once, 60 c. cm. being injected. From now on symptoms of paralysis developed with great rapidity. The sticky mucus increased greatly, and he vomited up bile and mucus twice ; he then lost all power of speech and of swallowing, and had severe spasms. He was quite conscious all the time, and was very distressed by the constant flow of sticky mucus, which had to be swabbed out of the back of the pharynx very frequently. He lost control of his sphincter ani, and had three copious watery evacuations within an interval of ten minutes. I ordered continuous oxygen inhalation at 11.30 a.m. as the respirations had become very shallow and sighing, interrupted every few minutes by a severe spasm, during which the back became arched, after one of which respiration stopped altogether. The patient was lifted to the floor, and I had to do artificial respiration for about a quarter of an hour before the respiratory movements recommenced and became in any way regular. Once this was re-established he seemed to turn the corner. From this time (12.45 p.m.) onwards the symptom that troubled the patient most was the flow of sticky mucus ; he had no more spasms. I saw him again about 2 p.m., when the respirations were still regular, but the pulse, which had been 80 to the minute, had gone up to 120, and later rose to 132. He complained by signs of great thirst, so I gave him ice to suck, which relieved him a little, but he still could not swallow water. I ordered atropine sulphate gr. 1/100 at 4.15 p.m. with the hope that it would not only stimulate the respiratory centre but also diminish the secretions. It came up to my expectations ; the secretions perceptibly diminished, and the respiratory movements became deeper. The patient now started to talk again, although the speech was very slurred, and I began to hope that he would pull through. At 8 p.m. the pulse became slower, although his temperature had gone up to 102° F. At 10 p.m. he was still restless, and I ordered that another atropine injection should be given if he had any respiratory trouble. At 10.30 p.m. he complained of a severe pain over his heart and had dyspnoea, and atropine gr. 1/100 was again injected. This had an immediate beneficial effect ; he slept for forty minutes, and from then onwards he did not look back. He slept off and on during the night, and by 7 a.m. on May 25th the only paralytic symptom noticeable was ptosis, which finally disappeared by 10 a.m. His only complaint now was the arm, which was very inflamed and swollen, and was sloughing where the gold chloride was injected. The sloughs subsequently came away, and afterwards a skin graft was applied ; the patient was discharged from the hospital without any contraction:"

There is a small doubt that, as the author says, the patient received a lethal amount of venom and was saved by the treatment adopted. The author considers that the atropine, as a stimulant of the respiratory centre, contributed to the success of the treatment.

A. A.

Sulley (E. W.). **Le parasitisme intestinal au Gabon.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 574–576.

Having examined several hundred Pahouins, the author thinks a statement of their intestinal parasites would be interesting, although he had no intention of determining their parasitic index.

In 81 per cent. of those examined intestinal worms were found, in the following proportions:—*Necator americanus* in 60 per cent., *Ascaris lumbricoides* in 51 per cent., *Trichocephalus trichiurus* in 36 per cent., *Oxyuris vermicularis* in 3 per cent., and *Strongyloides stercoralis* in 2 per cent. Mixed infestations of two, three, or four species were common enough.

Flagellate Protozoa—*Trichomonas intestinalis*, *Tetramitus mesnili*, and Cercomonas—occurred in 16 per cent. of those examined.

More than 15 cases of dysentery, acute or chronic, were observed. *Entamoeba "dysenteriae"* was found in the stools, but cysts were rare. *Endolimax nana* was found three times and Iodamoeba twice.

Almost all the Pahouins had microfilaria—usually perstans, more rarely bancrofti—in the blood; perstans was sometimes seen in great abundance in the blood-streaked mucus of non-amoebic dysentery cases. *Necator americanus* also sometimes caused intestinal haemorrhages.

A. A.

Reichenow (Eduard). [**Parasitos de la sangre y del intestino de los monos antropomorfos africanos.**]—*Bol. Real. Soc. Espanola de Hist. Nat.* 1917. Vol. 17. No. 5. pp. 312–332. With 2 plates. [Summarized in *Bull. Inst. Pasteur.* 1922. May 15. Vol. 20. No. 9. pp. 374-375.]

A paper dealing with parasites observed by the author in chimpanzees and gorillas, namely a Microfilaria which he identifies with *M. perstans*, and a trypanosome which he regards as a variety—*primatum*—of *T. lewisi*. The latter was observed also in the Lemurine Perodicticus, and in *Cercopithecus cephus*; in chronic infections its flagellum is short or wanting.

A. A.

Austen (E. E.). **Note on a Small Collection of Indian Tabanidae and Other Blood-sucking Diptera, Formed by Captain H. E. Cross, I.C.V.D., Sohawa, Jhelum District, Punjaub, and Received for Examination from the Royal Society of Tropical Medicine & Hygiene.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Feb. 16. Vol. 15. No. 8. p. 264.

Austen (E. E.). **Further Notes on the Tabanidae of Palestine, with Descriptions of New Species.**—*Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 151–160. With 4 text figs.

The descriptions include a new species each of Chrysops and Tabanus.

Bishopp (F. C.). **Insects in Relation to the Health of Man.**—*Texas State Jl. Med.* 1922. Aug. Vol. 18. No. 4. pp. 215–217.

An interesting survey of the subject.

Brug (S. L.) & de Rook (H.). *Bironella gracilis*, **Theobald 1905.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 133–137. With 1 plate.

Lynch (Kenneth M.). **A Note on Certain Coprozoic Organisms in Cultures from Man.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 223–224. With 8 text figs.

An uncritical note.

Macfie (J. W. S.) & Ingram (A.). **On the Genital Armature of the Female Mosquito.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 157–188. With 23 text figs.

A descriptive account of the female genitalia of 50 West African species of mosquitoes.

Mahulete (J.). **Een en ander over enkele Anophelinen van het eiland Ceram.** [On Some Anophelines from the Island Ceram, Moluccas, D.E.I.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 138–145. With 2 text figs.

de Mello (Froilano), Nunes (Joaquim Pinto) & Ribeiro (Josina Lima). **Morphologie et cycle évolutif de deux Bodonides.**—*C.R. Soc. Biol.* 1922. July 22. Vol. 87. No. 27. pp. 699–701.

Describes a complete mitosis in the multiplication of a free-living Bodo and also of *Bodo muris*.

Patton (W. S.). **New Indian Species of the Genus** *Musca*.—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 69–77.

Descriptions of five new species of Musca from India.

Swellengrebel (N. H.). **Twee, voor Nederlandsch-Indië, nieuwe Anophelinen.**—*Nederl. Tijdschr. v. Geneesk.* 1922. Apr. 15. Vol. 66. 1st half. No. 15. pp. 1535–1536.

Anopheles brevipalpis, Roper, and *A. punctulatus*, Dönitz.

Walch (E.). **Au sujet de la structure des oocystes des Plasmodies du paludisme.**—*C.R. du 4ième Congrès de la "Far Eastern Assoc. of Trop. Med."*—9 pp. With 6 plates. Weltevreden: Javasche Boekhandel en Drukkerij Rijswijk.

JUNGLE CLEARING IN MALAYA.

With reference to a statement published in "Recent Progress in Medical Zoology" (this *Bulletin*, Vol. 18, p. 2) that Malcolm Watson had shown "how by indiscriminate clearing of jungle innocent or not very harmful species of Anopheles may be eradicated only to open up a way for some extremely dangerous species," Professor C. Strickland writes to say that the actual discovery of this important principle was made by him, after several years of patient investigation, and not by Malcolm Watson. He supports his claim (1) with a copy of an article by Watson, reprinted from the *Malay Mail* of November 27, 1915, in which the discovery is attributed in terms of high admiration to Strickland, and (2) by a reference to a paper of his own on this discovery, which was communicated to this Bureau along with a reprint of the article by Watson, and was reviewed, with full appreciation of Strickland's observations and conclusions, in this *Bulletin* (Vol. 7, pp. 262–263).

I much regret to have done a specific injustice to Professor Strickland, and I can only say, in extenuation, that in the article on "Recent Progress" the discovery undoubtedly made by him was not being discussed in itself, but was merely used as an illustration of the need for the study of the oecology of the several species of Anopheles. On the subject of oecology the name of Malcolm Watson, as a leading authority, who had already noticed the existence of the special problem solved by Strickland and had already expressed the thought that its solution would be an oecological one, came first in my mind.

If, in emphasizing the original thought and attitude of Watson, rather than the original discovery made by Strickland in 1915, I have appeared to be oblivious of the merit of Strickland's work, I regret to think that I must have appeared equally oblivious of the work of Pratt, who observed in 1907 that streams in ravines near Kuala Lumpur were free from Anopheles larvae where the jungle was intact, but were infested with larvae where the jungle had been cleared, and of Wellington who in 1909 confirmed this observation; and equally oblivious of the perspicacious conclusions of Fletcher, who in 1908 pointed out the danger of clearing the jungle from such streams unless at the same time they are trained and cemented or bricked. I hope that these gentlemen, as well as Dr. Strickland, will accept this expression of my regret.

A. Alcock.

MALARIA.

Archives des Instituts Pasteur de l'Afrique du Nord. 1922. June. Vol. 2. No. 2. pp. 157–164. With 1 plate. **(i) Hommage à A. Laveran** (p. 157).

Laveran (A.). (ii) **Note sur un nouveau parasite trouvé dans le sang de plusieurs malades atteints de fièvre palustre** (Acad. de Méd., séance du 23 novembre 1880). (p. 157.) iii) **Deuxième note relative à un nouveau parasite trouvé dans le sang des malades atteints de la fièvre palustre** (Acad. de Méd., séance du 28 décembre 1880). (p. 158). (iv) **Troisième note relative aux éléments parasitaires trouvés dans le sang des malades atteints d'impaludisme** (Acad. de Méd., séance du 25 octobre 1881). (p. 160.) (v) **De la nature parasitaire des accidents de l'impaludisme** (C.R. Acad. Sci., séance du 24 octobre 1881). (p. 160.)

The recent death of Laveran prompts the reprinting of the original notices of his discovery of a parasite in the erythrocytes and blood of malaria cases, while working on November 6, 1880, at the Military Hospital, Constantine. The first communication to the Academie de Médécine announced the presence of crescents ; of rounded, pigmented, sometimes tentacled bodies somewhat smaller than an erythrocyte, and of larger rounded bodies which were held to be doubtless derived from the former ones by imbibition of serum. Of the second communication Léon Colin, who communicated it, says but little except to insist that these bodies will have to be clearly differentiated from leucocytes. The third communication announces the presence in water of pigmented bodies resembling those present in malarial blood.

In the *Comptes Rendus de l'Academie des Sciences* of October 24, 1881, these parasitic elements were carefully described. It was noted that, mixed with a weak solution of quinine, they died. They were found in 148 out of 192 malarial cases examined, most of those who were negative having had quinine. It was noted too that in those dying of malaria these pigmented elements were present in the blood and vessels of the spleen, liver, medulla and brain, and that the bodies which crammed the capillaries to the point of obstruction were clearly derived from the parasites which had died with their host. Laveran's conclusions were the following :—" Les accidents de l'impaludisme sont produits par l'introduction dans le sang d'éléments parasitaires qui se présentent sous les différents aspects décrits ci-dessus; c'est parce qu'il tue ces parasites que le sulfate de quinine fait disparaître les accidents de l'impaludisme."

Recent reviews of Manson's life work have made clear his appreciation of the functions of these detached tentacles, a matter on which Laveran could hazard no opinion.

Clayton Lane.

Leger (André). **Le paludisme à Dakar en milieu indigène. Documents hématologiques, index endémique, faune anophélienne, étude prophylactique.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. June. Vol. 1. No. 2. pp. 3–5.

An experience of three years of Dakar and the examination of blood from 240 children leads to the conclusion that during the wet season beginning in July the percentage of infection with *Plasmodium praecox*, *P. malariae* and *P. vivax* is respectively 91, 7 and 2, while the corresponding percentages for the dry season, beginning in December, are

48, 29 and 23. Of the indigenous Anophelines *Anopheles costalis* constitutes 80 per cent., *Anopheles funestus* and *pharoensis* being also present. The actual definitive host for the region has not apparently been determined. Malaria is considered the main mortality factor. The splenic index is viewed with distrust. The recommendations comprise the detection and thorough quininization of every infected person, the destruction of all breeding-places in and about Dakar, mechanical screening, and the spread of knowledge in schools. The heavy financial burden involved in the carrying out of this programme is held to be balanced by a great economy in the human factor.

C. L.

Leger (Marcel) & Baury (A.). **Index du paludisme à Dakar en saison fraîche.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 510–514.

Santarelli (P.). **Note sur le paludisme à Dakar.** *Ibid.* pp. 515 516.

i. In the middle of the cool season 1921–22 blood examination of 366 children from Dakar and the adjacent Medina, the last rain having fallen during the previous September, showed malarial parasites in 42·3 per cent. Of the infections 67 per cent. were with *Plasmodium falciparum*, 6 per cent. with *P. vivax* and 27 per cent with *P. malariae*. In general, infection diminished with age. Gametocytes, either alone or associated with schizonts, were found in nearly 7 per cent. of malignant tertian, in nearly 78 per cent. of benign tertian, and in over 98 per cent. of quartan infections. *Plasmodium malariae* was found in a child of 20 days old, which, as the writer notes, somewhat indecently hurries the transformation of forms, if the unity theorists are to be followed. Of 214 cases from Medina only 14 per cent. had an enlarged spleen, while the parasite rate was 50 per cent., a fact the more significant in that about half of those with enlarged spleen showed no parasites in the blood.

ii. The effect upon the naval personnel of residence in this malarial focus is described. In the years 1919, 1920 and 1921 the percentage of malaria among Europeans was respectively 176, 150 and 73, and of first attacks 64, 54 and 19 respectively. The improvement occurred thanks to antilarval measures and prophylactic quinine. The time is anticipated when a reduced anopheline population will produce an equivalent reduction in malarial incidence.

C. L.

Leger & Baury (A.). **Recherches sur l'Index endémique du paludisme en Guinée.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 497–499.

Investigations were carried out in the beginning of February, the height of the dry season, at Conakry and Kindia. Of 35 children examined at Conakry, the splenic index was 14·3, the parasitic 60. About Kindia, of 96 examined the indices were 7·3 and 45·7 respectively. In the main, infection lessened as age increased. There were 27 cases of infestation with *Plasmodium praecox*, 4 of them with gametocytes; the corresponding figures for *P. malariae* were 38 and 18; *Plasmodium vivax* was absent. In only 6 out of the 12 splenomegaly cases were parasites detected in the peripheral blood. At this season Anophelines were extremely rare, indeed only one, an *Anopheles costalis*, was detected.

C. L.

Palestine. **Report on Malaria in the Egyptian Expeditionary Force, 1918.** [Angus (W.), Lt.-Col., R.A.M.C., A.D.M.S., Sanitation, E.E.F.]—46 pp. With charts & maps. 1919. [MS. Report.]

A report upon malaria in the Egyptian Expeditionary Force during 1918 from Lt.-Col. W. Angus, A.D.M.S., Sanitation, E.E.F., to the Director of Medical Services, E.E.F., has been furnished by Dr. Manson-Bahr to the Tropical Diseases Bureau. It was circulated locally. Its value justifies wider publicity.

The military situation in the spring of 1918 demanded that the army in Palestine should stand fast all summer, in a belt of country where indigenous malarial infection reached 25 per cent., the figure in non-residents being 60. This decision was reached with the full knowledge, supplied by the medical staff, that it was a challenge to nature. The report recounts the manner in which the sanitary and medical personnel enabled this challenge to be carried to a successful termination. The line fell into three zones: the coastal plain; the stony Judean hills, 2,000 feet high, with deep intersecting valleys; the Jordan valley, 8–10 miles wide and 1,200 feet below sea level. In the coastal plain Anophelines bred in marshes, streams and irrigation channels; in the Judean hills in a network of mountain streams; in the Jordan valley in wadis, irrigation channels, swamps and backwaters; and everywhere in hundreds of wells and cisterns.

The Anopheles were:—*A. bifurcatus*, breeding all the year round in covered cisterns and wells; *A. palestinensis*, in clear water near springs and rivulets, breeding becoming active about April on the coast, May in the hills and March in the Jordan valley; *A. maculipennis*, round Muleblis in wells and irrigation channels, and in the Jordan valley in pools and backwaters. Less frequently found were *A. turkhudi*, common in the Jordan valley wadis; *A. pseudopictus*, in coastal marshes and sluggish water; and *A. fragilis*.

This stupendous problem the medical staff attacked thus. Each unit was required to furnish its antimalarial squad. For large works these were supplemented by corresponding detachments of infantry, Royal Engineers, by Indian Pioneer Regiments, which did their usual magnificent work, and by the Egyptian Labour Corps. Instances of the work done comprise the emptying of one marsh by pumping its water over a ridge into the sea, the draining of another by the opening up of a tunnel through the ridge which dammed it; the banks of the Auja, to mention one river only, were cleared, for its whole length of 12,000 yards, of vegetation of tropical luxuriance, and the whole canalized; its tributaries being similarly treated. Irrigation channels and wells formed a problem apparently simple but, from the apathy or active interference of the inhabitants, difficult. The effects of the oiling of wells and cisterns is of great interest. Opposed by the "Politicals" as likely to upset the inhabitants, it was nevertheless tried in two villages (after full explanations to the headmen of its reasons and effects, and after their inhabitants had been warned to draw off sufficient water to last them for 4 or 5 days) in the proportion of from 1/3 to 1 ounce of paraffin per square yard of surface. A few inhabitants protested against the unpleasant taste, most did not. The oil was found to entangle and destroy the adults as well as to kill the larvae, so that a very marked diminution in the flying insects occurred. As a significant sequel the inhabitants requested a month later, since mosquitoes were again becoming a nuisance, that the oiling should be repeated, and the process was made obligatory

throughout the XX Corps area. The effect on malarial incidence in troops and inhabitants was striking, and in one instance where malaria persisted, the discovery that inadequate surveying had resulted in the treatment of only half the wells and cisterns justified the conclusion that the facts stood as cause and effect. By such means even the pestiferous Jordan valley became less vile in its effects.

Excellent mosquito nets were issued but improperly used, so that it is questionable whether they were worth their cost. Repellents appear to have been of doubtful value. Prophylactic quinine, 5 gr. of the sulphate or hydrochloride daily, issued to two squadrons resulted in a malaria rate of 3·4 per cent., that of controls being 10·7. On the other hand 15 gr. of quinine biweekly among the German and Austrian personnel in Palestine, gave a malarial percentage of 60, no other antimalarial measures being taken. Sulphur, 15 gr. daily, appeared ineffective. General administration of prophylactic quinine was not ordered.

Diagnosis was by six malaria diagnosis units initiated, trained and supervised by Manson-Bahr, who also gave lectures on malaria, a new disease to many, to the personnel of the Field Ambulance of each Corps. A great deal of pressure from headquarters was required to get these Diagnosis Units utilized. Even when operations began one of them was left behind as a useless incumbrance. They examined 40,168 slides, of which 21·1 per cent. showed benign tertian, 6·5 per cent. malignant tertian, infestations. There were recognized 126 cases of mixed and 9 of quartan infection, and in 361 instances the organism of relapsing fever. The two military laboratories and the Anzac Laboratory examined another 71,093 slides. In treatment the point most stressed was the importance of giving quinine intramuscularly or intravenously in malignant infections.

With the advance in mid-September, the height of the malarial season, all effective prophylaxis of necessity ceased, and all attempts to attain the ineffective was deliberately set aside. "It was hoped that the latent period between infection and the onset of sickness would be long enough to enable the attack to be pushed home successfully before sickness caused any appreciable diminution in the fighting strength of the troops. And so it happened." But with not too much to spare. A battery, and a company of sappers, are instanced as having been temporarily wiped out by malaria, almost to a man, when they reached Damascus. And the same sort of thing occurred throughout the force. Moreover, had it not been for the diagnostic work carried out by the Malaria Diagnosis Units, the results might have been far graver than they were. For example, 11 out of 15 patients isolated in an ambulance as dysenteries were found to be cases of malignant malaria; and of 48 slides taken in one morning from men diagnosed as influenza, 30 showed the subtertian parasite. It cannot be doubted that these mobile units, undergoing if necessary binary fission with the orderly in charge of one half, saved many valuable lives.

C. L.

Sdrodowski (P.) & Lindtrop (G.). **Malaria im Gebiet von Lenkoran-Mughan bei Aserbeidshan.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 8. pp. 225–231. With 1 map in text.

In this part of the Western Caucasian Shore the splenic index between July and September, 1921, varied from 50 to 80·9, reaching

100 in certain restricted areas. The percentage in which parasites were detected in the 2,000 cases examined varied from 33·2 to 63·1. Among the infected the proportions in which the different plasmodia were found differed from region to region; *Plasmodium vivax* from 9·7 to 66·1, *P. falciparum* from 9 to 78·7 and *P. malariae* from 11·6 to 69·7 per cent. of the total infections. Anopheles were unusually numerous, and since, in the previous year, breeding places are held to have entirely disappeared from the steppes on account of the drought, it is concluded that they migrated "by continuity" from the nearest swamps, 10–30 kilometres away. The accepted age of infested persons varied from infancy to 100 years, the age of highest infection lay between 2 and 3 years. Natives show tolerance to infestation, the percentage of carriers among them being 13, two-thirds of them infected with quartan malaria.

C. L.

Jaarverslag der Malariacommissie voor Noord-Holland over 1921. [Report on the North Holland Malaria Commission for 1921.] [Aldershoff (H.), Chairman; Korteweg (P. C.), Secretary.]—Reprinted from *Verslagen en Meded. Betreffende de Volksgezondheid.* 1922. 26 pp. With 1 folding map & 3 figs.

The work for 1920 was abstracted in this *Bulletin*, Vol. 19, p. 282. The dates of appearance of larvae and of males of *Anopheles maculipennis* during 1921 were April 29 and May 1. Sprinkling ponds with creolin to the extent of 30–40 gm. per M. was destructive of all animal life; yet 4 weeks later this was abundantly present. The method is inapplicable where such destruction is not desired, or where the water is drunk. As a means of destruction of the mosquitoes themselves nothing was found equal to 3 per cent. lysol. With a view to establishing the optimum habitat of the imagines 23,322 places were examined during the year. Pig-sties and stables were most densely populated; byres were less favoured, on account of the dampness of the ceilings. Absence of air-movement characterized the most used habitats; nevertheless none were found in rabbit burrows or in the Naarden fortifications. Apart from a few cases of quartan, whose origin was doubtful, all were of benign tertian malaria. The percentage of clinical malaria in certain practices worked out at 8·10 as against 9·16 in the previous year. The percentage of infected mosquitoes was 6 in December, reaching, however, 13 in one lot of 200. Screening with gauze of 11 meshes to the centimetre is strongly advocated, detailed instruction for its arrangement being given. The whole report bears the imprint of thorough work.

C. L.

Neveu-Lemaire. **Les grandes endémo-épidémies intercoloniales. Le paludisme.**—*Presse Méd.* 1922. Aug. 23. Vol. 30. No. 67. pp. 1397–1403. With 3 maps in text.

The history of discovery of the malarial parasites and their life-history are outlined, and a general survey is made of the incidence of malaria in all the French Colonies. In view of the very definite morphological and biological characters of the three species of malaria parasites Neveu-Lemaire is unable to understand those who have revived the question of specific unity of the three forms.

C. L.

Walch (E.) & Walch-Sorgdrager (G. B.). **Een Epidemie van malaria perniciosa en tertiana, in hoofdzaak overgebracht door** *M. sinensis.* [An Epidemic of Subtertian and Tertian Malaria, principally transmitted by *M. sinensis.*]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 164–182. With 3 plates.

A full description is given by the authors of the malarial epidemic, the first part of which they reported before [this *Bulletin*, Vol. 19, p. 286]. Though *A. ludlowi* played an important part at certain times of this epidemic, throughout its whole course *A. sinensis* remained the principal carrier. The authors themselves give the following summary of this interesting account (abbreviated) :—

1. The malarial epidemic, prevalent at Sungei Tuan from the end of 1919 till the beginning of 1921 and substantially consisting of subtertian cases, had a mild character.

2. This may have been caused by the fact that *sinensis* was the principal carrier. *A. ludlowi* and *kochi* played a far less important part. Perhaps the larvae of *sinensis* under favourable circumstances have expelled those of the other species.

3. Not only the infection index but also the absolute number of infected mosquitoes is important in the causation of an epidemic.

4. The total number of cysts counted in the infected mosquitoes was higher in *ludlowi* than in *sinensis* ; notwithstanding the total number of infected *sinensis* was two and a half times that of the infected *ludlowi*.

5. In the cysts in *kochi* only coarse pigment was seen ; all sorts of pigment in *sinensis* and *ludlowi*.

6. A general quinine cure administered twice had a pronounced effect. Tertian was more resistant than subtertian, partly on account of its greater inclination to relapses, partly because tertian is better transmitted by *sinensis* than subtertian.

7. The effect of the separate measures taken against this epidemic is difficult to judge. Intensive catching of the mosquitoes in the later months is considered to have exerted an important preventive influence.

8. The use of buffalo stables as mosquito traps did not have the good results reported elsewhere.

W. J. Bais.

Godoy (A.) & Pinto (C.). [**Estudos sobre Malaria.**]—*A Folha Medica.* Rio de Janeiro. 1922. Apr. 30. Vol. 3. No. 8. p. 87. [Summarized in *Rev. Applied Entom.* 1922. Sept. Vol. 10. Ser. B. Pt. 9. p. 175.]

" In the District of Campos, State of Rio de Janeiro, *Anopheles* (*Cellia*) *brasiliensis* is the most common Anopheline, the other species there being *A.* (*C.*) *argyritarsis*, *A.* (*C.*) *albimanus* and *A.* (*C.*) *tarsimaculatus*. Microscopic examination showed *A. brasiliensis* to be infected with malaria, though the authors are not satisfied as to the value to be attached to such examinations of the stomachs of Anophelines."

C. L.

Regnault (Félix). **A propos du paludisme.**—*Presse Méd.* 1922. Oct. 4. Vol. 30. No. 79. pp. 1654–1655.

Among the accessory causes of malaria stress is laid upon the vicious circle induced by the apathy of the infected. They are too enervated to initiate the necessary hygiene. Wealth, too, with its accompanying

good nutrition, its avoidance of over fatigue, and its elimination of the single room home, where one infested member infects the whole family, has its evident effects. So far few will hesitate to follow him. It is otherwise with his third factor. That cattle should exercise a protective influence by providing Anopheles with food more likeable than does man is not unreasonable. But now appears again the story of the gun and the armour. Just as Roubaud claims that cattle-feeding Anopheles have jaws more powerfully equipped than do man-eaters, evidently adapted for piercing the stout bovine skin, so do the tanners tell Regnault that the cattle of the rich are refined and delicate skinned, those of the poor are bucolic ("rustique"), with skin thick and tough. The bovine armour has won the day in Macedonia, and the mosquito has to put up with man.

C. L.

Grassi (B.). **Animali domestici e malaria. Nuovo orizzonte nella lotta antimalarica.** [Domestic Animals and Malaria.]—*Ann. d'Igiene.* 1922. June. Vol. 32. No. 6. pp. 421–512.

Various views regarding the influence of domestic animals upon malaria are considered; personal observations are recorded; the lessening of malaria in Europe during the nineteenth century is reviewed; and the following conclusions are reached. It is reasonable to assume that, in any locality, domestic animals will furnish anopheline provender, and so lessen the call on man. Animal stalls and pigsties furnish Anopheles with shelter which appeals to them, provided these are dark and airless, and the females find there the warmth suitable for the maturation of their malarial parasites. [It is presumably not intended to suggest any foolish devotion to a parasitic brood.] Anopheles correspond in number to their breeding places, but show a tendency to diffuse towards their food. Anopheles are perhaps not so much misanthropic and zoophilic as thermotropic. In malarial foci zoophilia shows itself strikingly and renders the spot free or nearly free of malaria, a conclusion which is clearly not in accord with general experience. The questions which still require to be answered are, Grassi considers, the following. Do Anopheles anywhere really have a preference for man or for animals?; and if for animals, for what animal? Will an Anopheles which has bitten man confine its further feeds to man? Will an infected Anopheles, when the infection has reached its salivary glands, seek again the site of its infection, or turn to some neighbouring refuge?

C. L.

Howard (H. H.). **Malarial Relapses.**—*Southern Med. Jl.* 1922. May. Vol. 15. No. 5. pp. 343–347.

The argument unfolded in this paper centres largely upon the interpretation of the following table, which deals with the incidence of malaria in an area in Central Mississippi.

Infections are classed as "new" when the individual had had no malarial attack during the previous year, otherwise as relapses. Some difficulty occurs in interpreting the paper; possibly the writer has in mind unpublished facts. His conclusion that mosquito control should decrease the ratio of new infections to old ones (should increase, that is, the ratio of relapses) is unlikely to be questioned. That control should, as is apparently suggested, increase the actual number of

relapses is not obvious. The explanation given is that "by the terms of our classification the new infections of one season become apparent relapses of another season, if they develop a malarial attack." Surely this applies whether there be control or not. Again this occurs, "It is a significant fact that the incidence of malaria among the group classed as apparent relapses was very much higher each season than among any other group or all the remainder of the population of the areas." Clearly the table alone does not justify this statement.

Rates of Clinical Malaria for the Years 1918 *to* 1920, *inclusive.*

Year.	Location.	New Infections per cent.	Apparent Relapses per cent.	Totals.
1918	*Controlled Area.. ..	—	—	18·1
1918	*Non-Controlled Area ..	—	—	17·29
1919	Controlled Area.. ..	3·3	2·24	5·54
1919	Non-Controlled Area ..	6·5	3·7	10·2
1920	Controlled Area.. ..	1·94	3·08	5·02
1920	Non-Controlled Area ..	10·55	11·05	21·6

* No control measures were employed in 1918.

The second part of the paper is based upon nearly 16,000 cases collected from six different sources in literature; of which 56·5 per cent. are estimated by the original authorities as relapses. It is accordingly clear that a large percentage of malarial illness each year is due to relapse, and, as Howard urges, no amount of mosquito control can affect these cases. Accordingly the use of quinine for the sterilization of carriers is not only justified as an auxiliary measure, in all attempts to control malaria by antimosquito measures, but is essential if early and satisfactory results are to be obtained.

C. L.

SERGENT (Edm.). **Au sujet de l'expression "paludisme de première invasion."**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. p. 292.

Commenting upon BONAIN's criticism of certain terms used in connection with malaria [this *Bulletin*, Vol. 19, p. 291], Sergent points out that while the division of syphilis into primary, secondary and tertiary stages is excellent, that of malaria is unjustified; that the military term "paludisme de la première invasion" is useful and correct and corresponds to BONAIN's "paludisme de première atteinte," and that the terms "rechute" and "recidive" appear indispensable, the former signifying the recrudescence of an existing infection, the latter the appearance of a second infection in a subject which has been cured of a first.

C. L.

Trémolières (F.) & Caussade (L.). **Les complications cardiaques et aortiques du paludisme.**—*Rév. de Méd.* 1922. Vol. 39. No. 3. pp. 151–165.

Of 1,000 men invalided from Macedonia to France for malaria, 42 showed cardiac lesions; of 34 of these malaria is "the only possible cause." The cases include 17 of functional disorder, such as praecordial pain, palpitation and tachycardia; 9 with aortic lesions; and 8 with myocarditis. In the other 8 cases malaria aggravated pre-existing cardiac lesions. The writers believe that they have thus ended a 100-year-old dispute. It has to be noted that this belief entails unquestioned acceptance of the medical history sheet's diagnosis of malaria, and of the position that all symptoms in a malarial subject are of malarial causation, even when, as in Macedonia, the malarial illness rate could be greater than the strength. A Wassermann test was made in all cases. In the only one in which the result is noted it was negative. Does this imply that in the others it was positive?

C. L.

Papastratigakis (C.). **Contribution à l'étude du paludisme nerveux.** —*Rév. Neurologique.* 1922. Apr. Vol. 29. No. 4. pp. 394–401.

The nervous manifestations of chronic malaria are classed as meningeal, cerebral, medullary and neuritic. Apparently the test accepted as proving the malarial causation of these cases is the presence of a malarial parasite in the peripheral blood combined with the exclusion of other known causes. Except for an American quotation of date 1902, the references are all to papers in the French tongue.

C. L.

Rieux (G.) & Delater (G.). **Anémie et paludisme.**—*Rév. de Méd.* 1922. Year 39. No. 5. pp. 257–268.

Apart from anaemia of the ordinary type, which is fully considered, stress is laid upon the occasional presence in malaria of anaemia of the pernicious type. Two such cases are quoted from Coda. In both these cases malarial parasites were detected, and recovery followed quinine administration after the erythrocytes had fallen to 900,000 and 1,200,000 respectively [this *Bulletin*, Vol. 18, p. 333]. This paper adds a third case, a fatal one, in which there was infestation both with *Plasmodium falciparum* and a Taenia. No autopsy was possible. Anaemia of this type may be due, it is concluded, to cancer, fatness, syphilis, malaria, "bothriocephalus," ankylostomes and Taenia, and to unknown causes. It is accompanied by an aplasia of the intestinal mucosa, by achylia, and, possibly, by a primitive defect in the red marrow.

C. L.

Cardenas Sinclair (Zenobio). **Frecuencia y tratamiento de las esplenomegalias palúdicas de los niños.** [Prevalence and Treatment of Malarial Splenomegaly in Children.] *Crónica Méd.* 1922. Mar. Vol. 39. No. 705. pp. 94–98.

The value of this paper would have been enhanced had the statements made in different places harmonized.

The objects of the paper are to show, firstly, the prevalence of splenomegaly in children diagnosed as suffering from malaria, and, secondly, that the splenic enlargement is due to inadequate treatment with quinine.

One hundred and eighty patients are dealt with, of whom 105 lived in the city of Lima, on the banks of the river Rimác, and 75 in the suburbs. Of these there were 124 with enlarged spleens (68·8 per cent.).

In 83 of them blood examination revealed the presence of parasites : *P. vivax* in 58, *P. falciparum* in 22, and *P. malariae* in 3 instances.

In the blood of those with enlarged spleens it is stated that parasites were found in 67, and in the table the total is given as 67, but the figures are *P. vivax* 48, *P. falciparum* and *P. malariae* 16 each [total 80].

In the table giving the degrees of splenomegaly, there are records of 126 cases [not 124, as stated on three occasions]. There were 31 with the spleen extending a finger's-breadth below the costal margin, 48 to two fingers'-breadths, 20 to three, 20 to the level of the umbilicus and 7 to the level of the anterior superior iliac spine. As the result of treatment these enlargements disappeared in 5, 16, 22, 34 and 51 days respectively.

The treatment adopted was as follows :—An initial dose of sodium sulphate 10–25 gm. according to age ; then for a week three doses daily of 50 cgm. of sulphate of quinine to children between 8 and 13 years of age, and 30 cgm. to those from 4 to 8 years. During the second week the dose was reduced to 30 and 20 cgm. respectively. After a week's interval the last-named doses were repeated, followed by another week's rest, and in the sixth week a single dose of 20 or 30 cgm., according to age, as before.

Should there still be enlargement of the spleen or cachexia, the course is prolonged.

H. Harold Scott.

Mulherin (W. A.) & Mulherin (F. X.). **A Few Observations on Malaria in Infancy.**— *Jl. Amer. Med. Assoc.* 1922. June 17. Vol. 78. No. 24. pp. 1873–1875.

Acute malaria in infancy differs, in the writers' experience, from that in adults in that it is constantly afebrile, that parasites cannot be found in 30 per cent. of cases, and that periodicity of symptoms and of parasitic development are absent. In 75 per cent. of cases vomiting occurs, in 25 per cent. diarrhoea, in 70 per cent. a palpable spleen. Regarding the standard treatment closely associated with Bass's name [this *Bulletin*, Vol. 18, p. 97], the writers hold that it sterilized 75, not 90, per cent. of cases, but do not believe that the thick film technique gives a positive diagnosis in more than 29 per cent. of clinically positive malarial cases. They accordingly deprecate the withholding of quinine where parasites are unfound, and advocate, somewhat quaintly, "scientific treatment plus brains as the best up-to-date treatment of malaria."

C. L.

Olinescu (R.). **Le choc hémoclasique dans la malaria.**— *C.R. Soc. Biol.* 1922. July 22. Vol. 87. No. 27. pp. 751–752.

In 40 cases of malaria, 15 tertian, 9 quartan and 16 subtertian infections, without pigment or uribilin in the urine, perhaps with an occasional and temporary albuminuria, all having had quinine in most

cases orally in a few severe ones subcutaneously, the following experiments were undertaken after about a week's apyrexia. The men fasted one evening. Still fasting, the blood pressure and leucocytic count were taken next morning. Each was then given 200 gm. of milk [this *Bulletin*, Vol. 14, p. 273], and the blood pressure and leucocytic count were again determined. If the leucocytic count had fallen by 2,000 the cases were considered positive; if by 1,000 with a fall in pressure of 20 mm., doubtful. Of the 40 men, 13 were positive, 6 doubtful, and 21 negative. The corresponding figures for the various infections were: benign tertian 4, 3 and 8; quartan 3, 2 and 4; subtertian 6, 1 and 9. Speaking generally the positive cases had been imperfectly treated for a previous malarial attack.

C. L.

Sklarz (Ernest). **Häufung von Malariatodesfällen nach Salvarsaninjektionen.** [Deaths from Malaria after Salvarsan Injection.] —*Klin. Woch.* Berlin. 1922. July 8. Vol. 1. No. 28. pp. 1414–1415.

Friedemann (Ulrich). **Ueber die bedrohliche Ausbreitung der tropischen Malaria in der einheimischen Bevölkerung und ihre Beziehungen zum Salvarsan.** [The Threatened Extension of Tropical Malaria in the Home Population and its Relation to Salvarsan.] —*Ibid.* Aug. 12. Vol. 1. No. 33. pp. 1642–1648.

These communications add 13 to the cases of malaria appearing or reappearing after the administration of salvarsan. Of this number seven were sent to hospital as typhoid, the others as influenza, cerebral influenza, diarrhœa, perforated gastric ulcer, acute yellow atrophy of the liver, encephalitis after salvarsan. Four died, three of them undiagnosed during life, the fourth shortly after diagnosis. Blood examination and quinine saved the others. Two had been in Macedonia, one in Russia, five in France and four had never left Germany. The infection was in all cases with the subtertian parasite. It is urged that when any doubtful case occurs in Germany malaria should be considered, particularly if salvarsan have been administered.

C. L.

Sari (Emile). **Le paludisme, maladie professionelle, chez les marins pêcheurs.**—*Bull. Acad. Méd.* 1922. July 4. 3rd Ser. Vol. 88. No. 27. pp. 14–15.

Although employés in the customs, railways and telegraphs of Corsica have malaria included in the disabilities which may result from their work, this is not the case with fishermen. It is urged that sea-fishers should come under the Marine Office, for, although they are not infected upon the sea, their work compels them to land. Fishers on the marshes have no benevolent department to which ingenuity can attach them.

C. L.

Eisendrath (B.). **De belangrijkheid van het bloedonderzoek in malariastreken.** [Importance of Blood Examination in Malaria Regions.]—*Nederl. Tijdschr. v. Geneesk.* 1921. Apr. 23. Vol. 65. (1st Half-year.) No. 17. pp. 2268–2272.

The impossibility of establishing or excluding malaria without microscopic examination of the blood is insisted upon.

C. L.

Sinton (J. A.). **A Case of Malaria due to** *Plasmodium tenue* **(Stephens).** —*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 215–235. With 2 plates & 1 chart in text.

This paper is illustrated by 40 camera lucida drawings, and by 7 micro-photographs by Lt. Col. S. R. Christophers, and contains very detailed descriptions of the parasites found. The case described is one of five seen within a month, all apparently at the Central Jail, Nagpur, C.P., India, in which jail the patient had resided two years. The original case of *Plasmodium tenue* came from Singanama, 100 miles from Nagpur. The infection was severe, 1 erythrocyte in 12 being infested, yet the temperature only once exceeded 101° F. and fever disappeared without treatment. The tenue type of parasite was not persistent but occurred between the 26th and 32nd hours after segmentation, mainly on alternate days and most markedly at the edges and ends of smears. Stephens' *P. tenue*, it is concluded, is here dealt with; its characters are of specific value, provided that before such specificity is absolutely proven it will be necessary to re-examine *Plasmodium falciparum* to make quite certain that a tenue stage, hitherto undescribed, does not exist in the cycle of the parasite. Sinton finds striking resemblances between the forms he describes and *P. immaculatum*, Grassi & Feletti, 1907.

C. L.

Hesnard (A.). **Paludisme et psychoses constitutionnelles.** —*Arch. Méd. et Pharm. Nav.* 1922. July–Aug. Vol. 112. No. 4. pp. 287–293. With 2 charts in text.

Holding the view that in mental affections the constitution determines the symptomatic plan while some intercurrent cause, generally some infection, initiates the process, Hesnard considers malaria to have constituted such a factor in a Serbian non-commissioned officer.

This youth with a mental equipment easily exalted or depressed, and a brain packed by voracious and indiscriminate studies in all manner of directions, became infected with malaria on the Salonica Front and developed insanity characterized by maniacal excitement. He became the "Commandant of Europe," with conduct in unreasonable accord. The infection was with *Plasmodium falciparum*, and the symptoms and physical signs were as usual. Cured of his malaria he became, after nine months, depressed—miserable regarding the ridicule he felt he had brought upon himself by his recent behaviour. Complete bodily and mental cure followed. He was repatriated in 1918, since when an English Red Cross Society has twice reported his continued freedom from mental trouble.

C. L.

Villa (Luigi). **Per la casistica clinica della malaria: meningismo in latenza.**—*Policlinico.* Sez. Prat. 1922. July 3. Vol. 29. No. 27. pp. 869–875.

The writer discusses at length two cases, each with a history of previous malaria, a meningeal condition, an enlarged spleen and a complete absence of malarial parasites from the peripheral blood.

C. L.

Urechia (C. I.). **Paludisme chronique compliqué de crises confusionnelles transitoires et de polynévrites multiples.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. July 13. 38th Year. 3rd Ser. No. 24. pp. 1070–1073.

A man of 34, first infected with malaria at 18, had during 1913 a railway accident involving cerebral traumatism, unconsciousness, and psychic troubles which required a year for recovery. Taking to drink, he celebrated Christmas by running through the streets naked and obstreperous. Complete double ptosis followed, with intense trigeminal neuralgia, diplopia, loss of taste in the anterior two-thirds of the tongue, oedema about, and visibility of, the right temporal vessels. The Bordet-Wassermann reaction was negative even after provocative doses of neosalvarsan. There was a mononucleosis amounting to 28 per cent. The blood examination, after the administration of quinine, revealed no parasites. The diagnosis rests on clinical evidence and on the fact that recovery followed the administration of quinine.

C. L.

Pratsicas (André). **Un cas de pleuresie et méningite spinale au cours d'une fièvre remitente palustre.**—*Grèce Méd.* 1922. July–Aug. Vol. 24. No. 7–8. pp. 35–36. With 1 fig. in text.

A man of 25, suffering since childhood from epilepsy and malaria (after being in hospital for nearly a month with pleuritic effusions, certain nervous symptoms, headache, and latterly with lapse into the typhoid state), had his blood examined. Parasites of subtertian malaria were found. Cure followed the exhibition of quinine, although contractures of the lower limbs persisted.

C. L.

Godillon. **Sur un cas de rupture de la rate, d'origine paludéenne.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. Jan.–Feb. Vol. 3. No. 11–12. pp. 11–12.

A man, constantly ailing from fever, easily fatigued, became ill one morning, vomited in the afternoon, apparently fell at some time, and died syncopic. Post-mortem the abdominal cavity contained a huge clot on its left side, a clot emanating from a rupture in the upper pole of a thin-capsuled spleen, which measured 25 by 10 cm. (10 by 4 in.). It is considered that the rupture was spontaneous and not traumatic.

C. L.

Wollenberg, Hans Werner. **Ein Fall von "endemischer" tropischer Malaria in Berlin.** [A Case of Endemic Subtertian Malaria in Berlin.] —*Deut. Med. Woch.* 1922. Aug. 4. Vol. 48. No. 31. p. 1042.

In a man who served during 1915 at Warsaw, where, so it is stated, only benign tertian malaria exists, and later at Arras, there occurred in December, 1921, a typical attack of subtertian malaria, microscopically established, while he was being treated in Berlin for syphilis with sodium salvarsan. His condition became grave with defective reaction to quinine, which, however, finally established a cure. The swarms of mosquitoes in Berlin in the summer of 1921, and the presence of numbers of infected troops there, make autochthonous infection possible.

C. L.

Duzár (Josef). **Ueber die Malaria im Säuglingsalter.** [Malaria in Infants.] —*Fortschritte der Med.* Berlin. 1922. Mar. 22. Vol. 40. No. 12. pp. 268–270.

Although from 1872 to 1881 there were seen at the Stephanie Children's Hospital, Budapest, 15 to 28 cases of malaria annually, no case presented itself there from 1901 to 1920. A child of eight months old infested by a malarial parasite, whose specific position it is impossible to allocate from the description, forms the basis of this paper.

C. L.

Raja (R. N.). **Post-Mortem Examination in Cerebral Malaria. A New and Simple Method of Demonstrating Parasites in the Capillaries of the Brain.**— *Indian Med. Gaz.* 1922. Aug. Vol. 57. No. 8. pp. 298–299. With 1 plate.

"A piece of brain tissue from the cerebrum or cerebellum is pressed between two slides and the material thus obtained is transferred to a clean slide and spread out with the edge of another slide taking care to draw the spreader in only one direction. The smears are dried in the air or over a flame, fixed with alcohol or equal parts of alcohol and ether and stained by Giemsa's method or by diluted Leishman's stain; or they may be stained by the ordinary Leishman's method without preliminary fixation. Smears prepared in this way usually contain several portions of capillaries of varying lengths which, in cases of cerebral malaria, are filled with malarial parasites."

C. L.

Brahmachari (U. N.). **Dangers of Rapid Intravenous Injection of Concentrated Solutions of Quinine Bihydrochlor.**— *Jl. Trop. Med. & Hyg.* 1922. July 1. Vol. 25. No. 13. pp. 209–211.

——. **Dangers of Rapid Intravenous Injection of Quinine Solution.**— *Lancet.* 1922. July 22. pp. 175–176.

Following the writer's practice, these two papers are identical except for a few inconsiderable verbal differences and the number of tables. In his opinion the amount of quinine injected intravenously should not exceed 1/120 gr. per second, or ½ gr. per minute. The injection of 10 gr. is accordingly spread over 20 minutes, the total quantity of fluid not exceeding 200 cc. Since the tables deal only with slow injections in weak dilutions, the writer's conclusions cannot be based upon them.

C. L.

Mukarji (R. M.). **Intravenous Quinine in Malaria.**— *Indian Med. Gaz.* 1922. July. Vol. 57. No. 7. pp. 258–260.

Quinine intravenously in malaria is recommended as not so risky an operation as it is supposed to be. An experience of over 200 cases in which the bihydrochloride was injected, as many as seven times, in doses of 5–10 gr. dissolved in 20 cc. of sterile water induces the conclusion that the method is safe, and that larger dilution is unnecessary.

C. L.

Rayson (H. Knights). **Muscle Necrosis.** [Correspondence.]—*Brit. Med. Jl.* 1922. Sept. 16. p. 533.

A warning as to the risk of muscle necrosis in intramuscular injection of quinine is accompanied by advocacy of the subcutaneous route. The advantages claimed for the subcutaneous over the oral route are: possibility of administration during vomiting, absorption into the blood, relief of muscular pains, quick and certain action, convalescence occurring with six to eight injections of from 5 to 10 gr. It is not suggested that they are equally advantages of the intramuscular route, with which the comparison should lie. That muscle necrosis must be absent if quinine be not injected into the muscle is obvious, but it is, nevertheless, admitted that local necrosis occurred in six out of some hundred cases. Presumably good fortune has avoided nerve necrosis in these cases, and cutaneous sloughing in a lady's arm.

C. L.

Silvestri (Silvestro). **La cinconina nella cura della malaria.** [Cinchonine in the Treatment of Malaria.]—*Policlinico.* Sez. Med. 1921. Dec. 1. Vol. 28. No. 12. pp. 529–545.

In the cases here detailed cinchonidine sulphate in doses of 1 to 2 gm. had no ill effects. It was as effective as, often more effective than, quinine in producing clinical cure. The courses were short, so that it would be unreasonable to blame the drug for the relapses which followed its discontinuation.

C. L.

Amantea (Fausto). **Il potere curativo della cinconina nella malaria.** [The Curative Power of Cinchonine in Malaria.]—*Policlinico.* Sez. Prat. 1922. Sept. 18. Vol. 29. No. 38. pp. 1231–1235.

Tried in 24 cases of tertian, subtertian, and quartan malaria, simple and clinically grave, in doses of 2 gm. daily this drug proved itself safe, rapid, efficacious, completely tolerated, and producing no disturbance of any kind. X-rays were used over the spleen in two instances. Tartar emetic was inefficacious with every kind of parasite at every stage of the disease.

C. L.

Howards & Sons, Ltd. **The Price of Quinidine.** [Correspondence.]—*Indian Med. Gaz.* 1922. Sept. Vol. 57. No. 9. p. 358.

Howards & Sons, writing as the only British manufacturers of quinidine, point out, in answer to criticism by Acton, that their prices of quinidine sulphate and other products have, since 1917, risen in price to an extent barely proportionate to the rise of price of quinine.

C. L.

Kramer (P. H.). **Over malaria en over de behandeling der hardnekkige gevallen.** [On the Treatment of Persistent Cases of Malaria].—*Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 5. Year 65. (2nd Half-year.) No. 19. pp. 2289–2295.

In two cases of malignant tertian and in one case of benign tertian malaria the author obtained excellent results with the combined neo-salvarsan and quinine treatment. In a third case of malignant tertian

the good results were only very temporary. The treatment consists in giving three intravenous injections of 450 mgm. neo salvarsan at weekly intervals, irrespective of the temperature, and during the intervals 1 gm. of quinine in pills on three or four successive days.

T. Joekes.

Nieuwenhuyse (A.). **Neosalvarsan en Malaria.** [Neosalvarsan in Malaria.]—*Nederl. Tijdschr. v. Geneesk.* 1921. June 18. Vol. 65. (1st Half-year.) No. 25. pp. 3349–3354.

In patients who cannot take quinine in any form Nieuwenhuyse tried the intravenous injection of neosalvarsan. In cases of benign tertian malaria the symptoms often subsided after a single dose, and no further parasites could be found in the blood. Occasionally, however, there is a relapse. In malignant tertian there is a temporary benefit; the anaemia improves and the parasites in the films stain with difficulty, their protoplasm showing signs of disintegration; relapses occur regularly. This treatment was tried without effect in one case of quartan.

T. J.

Conseil (E.) & Gérard (F.). **Essais de traitement du Paludisme par le "Trépol."**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 534–537. With 4 charts in text.

Trépol, a tartaro-bismuthate of potassium and sodium, given in injections of 2 to 3 cc. in 10 cases of malaria, microscopically established, some at least of them being infections with *Plasmodium falciparum*, produced inconstant therapeutic results—good, indifferent, and bad.

C. L.

Spagnolio (Giuseppe). **Alcune modificazioni del sangue nei malarici trattati coi raggi x.** [Malarial Blood Changes in those treated by X-rays.]—*Giorn. di Clin. Med.* Parma. 1922. July 20. Vol. 3. No. 10. pp. 373–388.

Since both X-rays and quinine were used in the cases here described, and since controls were absent, the large amount of enthusiastic labour expended does not lead to firm conclusions.

C. L.

Castelli (A.). **Sulla divisione delle forme anulari dei parassiti malarici.** [The Fission of the Malarial Parasite.]—*Ann. d'Igiene.* 1922. Apr. Vol. 32. No. 4. pp. 259–263. With 1 plate.

In the blood of a child of two, erythrocytes were found, containing 2 to 4, some with as many as 8 to 10, rings, occasionally possessing falciform projections of protoplasm. In a few of the corpuscles the chromatin dots numbered 12 to 14. Gametocytes were round, semilunes being absent, which, taken with the appearance of the rings, induced a diagnosis of benign tertian malaria, the possibility of a double infection being ignored. It is considered that precocious multiplication of parasites is a more reasonable explanation of the facts than is multiple infection of erythrocytes. The bold style of drawing adopted, as, for example, in an absolutely bilaterally symmetrical heart-shaped body, does not render the easier the interpretation of the plate.

C. L.

Kitaeff (F.) & Joff (I.). [In Russian. Abridged Version in French.] **De doubles infections d'érythrocytes et leur rapport à la parténogénèse des macrogamètes en cas de Malaria tertiana.**—*Rév. Microbiol. et Epidémiol.* Saratov. 1922. Vol. 1. No. 1. pp. 72–73. With 1 plate.

Commenting upon a case of benign tertian malaria with abundant parasites and with many double and multiple infections of individual erythrocytes with schizonts, with schizonts and gametocytes, and with gametocytes, the writers point out that in Schaudinn's own plates there is no morphological difference between the conditions he describes as double infections and as parthenogenesis of macrogametes. Their own infections include all combinations and gradations. Upon Schaudinn's hypothesis these observations would imply parthenogenesis of microgametes, and it is concluded that no proof of the parthenogenesis of macrogametes is in existence. [See this *Bulletin*, Vol. 11, p. 1.]

C. L.

Hornus (Pierre. **Note sur les formes atypiques de** *Plasmodium praecox.*—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1922. June. Vol. 2. No. 2. pp. 227–229. With 12 text figs.

Yet two more instances are adduced of infection with *Plasmodium falciparum* in dying, untreated men in which typical are accompanied by atypical forms. The parasites were apt to take horse-shoe, comma, and other shapes, the chromatin and its surrounding vacuole to be divided and deformed, the central mass of pigment, round which segmentation occurs, to be solid. These unexpected forms are held to be part of the normal cycle in the haemopoietic organs, it being merely their thrusting into the open of the circulating blood which is abnormal.

C. L.

Bini (Guido). **Colorazione delle gocce spesse di sangue (thick films) per la ricerca dei parassiti malarici. Il nota di tecnica microscopica.** [Thick Drop Staining of the Malarial Parasite. A Note on Technique.]—*Policlinico.* Sez. Prat. 1922. July 10. Vol. 29. No. 28. pp. 913–914.

The writer recommends the following technique for thick drop staining as superior to his own (*Malariologica*, 1920, Nos. 4, 5, 6) or that of Schilling (Jena, 1920, Gustav Fischer).

Upon a thoroughly cleaned slide three or four drops of blood are spread over a circle with a diameter of one or two soldi and dried in the horizontal position for at least two hours. The slide, lying across two glass rods, is covered with an aqueous solution of Giemsa in the proportion of one drop to 1 cc. of distilled water. After two or three minutes it is drained by lateral tilting, replaced horizontally, and covered with Leishman's stain, again in the proportion of one drop to 1 cc. of distilled water; the stain itself being made by dissolving one of Burroughs Wellcome's tabloids in 10 cc. of absolute methyl alcohol. After standing for six or eight minutes it is drained by lateral tilting, washed in distilled water, and dried in the air in a vertical position. Chromatin is coloured a brilliant rose-red, protoplasm blue. This technique has been found to add 10 per cent. positives to cases judged negative by the film, and with a much smaller expenditure of time.

C. L.

Mouchet (R.). **De la valeur clinique de la formule leucocytaire dans la malaria.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 275–280.

The writer's blood-counts show in malarial films a definite mononuclear, but not a large mononuclear, increase, the lymphocytes being augmented. The leucocytic formula is held to give to the medical man an excellent and certain diagnostic sign and an easy means of controlling the effects of treatment.

C. L.

Swan (John M.). **A Contribution to the Question of the Leukocyte Formula in Malaria.**—*Amer. Jl. Trop. Med.* 1922. July. Vol. 2. No. 4. pp. 283–288.

In 68 differential counts of his own a large mononuclear increase was constant neither in the acute nor chronic stage. If present, it is held reasonable to assume that the patient has or has had malaria.

C. L.

Mayne (Bruce). **How Long does a Mosquito retain Malaria Parasites?** —*Public Health Rep.* 1922. May 5. Vol. 37. No. 18. pp. 1059–1063.

The maximum life of an *Anopheles punctipennis*, laboratory-bred and fed on dates and water, was 231 days, the temperature varying between 45° and 75° F. In one trial the average life-span of 85 specimens was 90·4 days, eight of them living from 175 to 203 days. In another series, given one to three feeds of blood and thereafter fed on fruit juices, the average life-span of 22 *A. punctipennis* was 100 days, of 4 *A. crucians* 65 days, and of 6 *A. quadrimaculatus* 73 days. The average life-span of infected mosquitoes does not appear to have been tested. Regarding the survival and viability of malarial parasites, an *A. punctipennis* was fed upon a crescent carrier. A volunteer host was bitten 55 days later, and in due course developed subtertian malaria microscopically established. On the 67th day this mosquito failed to cause infection of another volunteer on which she fed, although on the 68th day dissection showed very active sporozoits in her salivary glands. A second mosquito was found to harbour living sporozoits on the 70th day after failing to infect on the 61st, while in a third the corresponding figures were 71 and 66. Sporozoits, apparently dead, of *Plasmodium falciparum* were found as late as the 95th day, and of *P. vivax* on the 105th day.

C. L.

Sinton (J. A.). **A Simplified Method for the Cultivation of *Plasmodium falciparum* in vitro.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 203–209. With 1 plate.

——. **Further Remarks on a Clinical Method for the Cultivation of the Subtertian Malaria Parasite *in vitro*, with a Note on its Use in Diagnosis.**—*Ibid.* pp. 210–214.

Since it was felt that cultural methods might facilitate the diagnosis of latent malaria, investigation was undertaken with a view to lessening the amount of blood required for these, and reducing the number of transfers from tube to tube. The whole apparatus, with the exception of some glass beads and a pipette, is made from a single piece of glass tubing about a foot long and 4–5 mm. wide. The description of manufacture cannot be satisfactorily summarized, but those wishing

to repeat the technique will find it fully detailed in the original. The statement that the best growth of malarial parasites occurs on the surface of a layer of erythrocytes, and that this must be covered by a pool of serum at least 12, but preferably 24–48 mm. deep, governs the details of manufacture. In view of the difficulty of obtaining from the finger of an anæmic malarial case sufficient blood before clotting occurs, to produce the requisite quantity of serum, this last is replaced by ascitic, or, as Sinton finds equally efficacious, hydrocele fluid.

When the temperature of the incubator was adjusted at about 37° C., or a little lower, growth was at its optimum; when between 38° and 41° C. development rarely proceeded beyond half to two-thirds growth, sporulation being exceptional [which suggests that the malarial febrile reaction is inimical to the parasite]. Later it was found that, in a thermos flask filled with water at 40° into which the culture tube was lowered, the temperature drops to 38° before it is closed, and thereafter half a degree hourly; and that a temperature of between 32° and 38° C. is suitable for growth; so that by filling such a flask with water at 40° every 12 hours, the result is satisfactory for the growth of the subtertian parasite.

The routine recommended for the diagnosis of malaria is the following, carried through till a positive finding results. Examination of a thin and then of a thick film by one of the recognized techniques. Similar examination in thin and in thick films of cultures 24 and 48 hours old. Treat the balance of the cultures as follows:—Decant the serum for use in other cultures and haemolyse and decant the sediment by adding to it 1 per cent. commercial formalin. Centrifuge, decant and repeat the washing with formalin as often as is necessary to give a clear supernatant fluid. Wash and centrifuge twice in water. Replace the water by a small quantity of serum and examine the residue in thick and in thin films. "By using the steps given above it is often possible to find parasites when examination of the peripheral blood by both the thin and thick film methods has proved unsuccessful."

Actual evidence of the extent to which this technique, with its use of small quantities only of peripheral blood, and of serum carried over from a previous culture, is effectual in giving an accurate positive and negative diagnosis will be awaited with interest.

C. L.

Bass (C. C.). **Some Observations on the Effect of Quinine upon the Growth of Malaria Plasmodia in vitro.**—*Amer. Jl. Trop. Med.* 1922. July. Vol. 2. No. 4. pp. 289–291.

To 2 cc. of the ordinary defibrinated dextrose blood culture of *Plasmodium falciparum* was added 0·005 cc. of a 15 per cent. solution of quinine bihydrochloride, corresponding to 2 gm. in the total blood volume of a man of 150 lb. After five hours' incubation no growth had occurred, some parasites had shrunk into small spheres, most stained badly, a few stained deeply. After 29 hours the plasmodia barely stained and were evidently dead. In a control they developed excellently.

To one of two tubes, each containing 2 cc. of blood culture, quinine was added as above; the other was untreated. After 20 minutes both were centrifuged and the sera interchanged. At the end of 29 hours, in the tube whose corpuscles had been in contact with quininized serum for 20 minutes, nearly all parasites had disappeared,

those remaining being shadowy. In the tube whose corpuscles were only mixed with serum after this had first been in contact with other infected corpuscles for 20 minutes the contained parasites were much more evident. These results were twice repeated with similar results, and are held, so far as they go, to "show that quinine in therapeutic proportions prevents the growth of malaria plasmodia *in vitro*, and, in fact, kills them." Only *Plasmodium falciparum* was used.

C. L.

VAN DEN BRANDEN (F.) & VAN HOOF. **Le paludisme peut-il fausser le résultat de la séro-réaction de Bordet-Wassermann ?**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 3–6.

In 15 cases the Wassermann reaction, carried out with the antigen of BORDET and RUELENS and by the technique of CALMETTE and MASSOL, proved negative in all but one. In this one there were obvious stigmata of congenital syphilis, and the mother, too, was positive. It is not always clear what species of parasite is in consideration, since the terms *Laverania malariae*, *Plasmodium malariae* and *Plasmodium praecox* are all used.

C. L.

SERGENT (Edmond & Etienne), with PARROT (L.) & DONATIEN (A.). **La prophylaxie du paludisme en Corse.**—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1922. Mar. Vol. 2. No. 1. pp. 1–51. With 5 maps in text.

The first part of this communication, dealing with epidemiology, has already been dealt with [this *Bulletin*, Vol. 19, p. 280]. The second treats of prophylaxis. The big drainage canals in the eastern coastal plain of Corsica, instituted years since, have failed to drain the marshes and are themselves anopheline breeding-places. Small breeding-places are there in legions, and during their tour the writers were able to find but one instance in which care of a single possible breeding-place was evident. They discovered also but three persons using mosquito nets. In two of these an Anopheles was snugly enclosed with the sleeper. In the third provision was made for the mosquito's easy entry. Similarly but one satisfactorily screened house was discovered. The railways, for instance, have screened their premises at great expense, but do not keep them in order. ROUBAUD and LEGER had found that Corsican Anopheles prefer man to beast, and had noted as an exception a Corsican farm where, in the spring of 1921, the stable harboured these in plenty, the house containing none. In the autumn of that year the Commission found in the stable no female Anopheles, while in the house they caught six in a few minutes, one replete.

Recollecting that of the 80,000 persons inhabiting the Eastern Corsican Plain, only some 5,000 (indigent or tied by their occupations) remain there the year round, that they are heavily infested, that Anopheles are universal, and that the immense drainage works already carried out have had no obvious effect upon malaria, it is concluded that concentration upon disinfestation of the human population offers the means most likely to be effective in checking malaria. To combine cure with prophylaxis in one dosage is aimed at, and the means advised are that every adult should take every day 0·4 gm. of quinine sulphate for the seven months, April to October, children having proportionate doses. This means of attack should be started in selected centres,

and carried out, under the Sanitary Officer, by an individual who will himself see the quinine swallowed by every person in his jurisdiction every day. He must be keen, disciplined, absolutely conscientious and satisfied with a pay of 100 francs a month for seven months only in the year.

C. L.

Marcou (H.). **Les causes de l'aggravation du paludisme en Corse.** — *Presse Méd.* 1922. Aug. 19. Vol. 30. No. 66. p. 1380.

This contribution to the problem of malaria in Corsica, a problem which is acutely exercising French minds [see above], holds that the emigration now proceeding from Corsica can best be stopped, not by attacking the Anopheles, but by eliminating malarial parasites from their human hosts, thus rendering Anopheles as harmless as transmitting agents in Corsica as they are in Paris. The writer's suggestion is that each district should organize its own mobile anti-malarial staff, consisting of doctors, druggists, nurses, and especially school masters, to whom is to be entrusted the diagnosis of malaria by splenic palpation of the children they teach. In this way, "with much goodwill and at little cost the cure of all the fever-stricken will be attained." His own comment is that goodwill is rarer than silver.

C. L.

David (J.). **La pratique antipaludéenne en Basse-Galilée.** — *Rev. Méd. et Hyg. Trop.* 1922. Jan.–Feb. Vol. 14. No. 1. pp. 5–11. With 1 chart in text.

The plain of Esdraelon and the shores of the Lake of Tiberias, 200 metres below sea level, are among the most fertile and most malarious spots in Palestine, and are the sites of ever-growing European colonies. In August, 1920, some 600 Europeans were introduced to construct an embankment on the western shore of the lake. The blood of all these was examined on arrival. Any person found infected with malaria was admitted to hospital and received two intramuscular injections, at intervals of 12 hours, each of 2 gm. of bihydrochloride of quinine; and thereafter three times a day for 10 days a pill containing 0·1 gm. (1½ gr.) of hydrochloride of quinine. All persons subsequently found infected were similarly treated. Prophylaxis was limited to a daily dose of 0·3 to 0·6 gm. of quinine hydrochloride. Cases where gametocytes were discovered received a single intramuscular injection of 0·2 gm. iodine, 2 gm. salol, and 10 cc. of olive oil, a second injection rarely being given since these elements usually disappeared. In cases where blackwater fever was feared an injection of 0·05 gm. (1 cc. of a 5 per cent. solution) was given 2–3 days before the massive dose; or "vaccination subintrante" was practiced by injecting at 2, 4 and 6 p.m. 1, 2 and 5 cc. of a 5 per cent. solution of quinine, and at 8 p.m. 4 cc. of a 50 per cent. solution, this dosage being repeated 12 hours later.

Of the 600 men 20 per cent. became infected with malaria; 80 with subtertian and 47 with benign tertian parasites. Only 6 of the 80 subtertian subsequently showed a benign tertian infection, although 14 relapsed. The benign tertian infections showed 10 relapses. Among 50 cases regarded as primary and treated immediately as above, no relapse occurred. Of chronic cases 20–25 per cent. relapsed and required prolonged treatment.

C. L.

Blanchard (M.). **Les insuccès de la quinine préventive dus à l'insolubilité des comprimés.**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 293–295.

Blanchard attributes much of the failure of prophylactic quinine to the fact that it is not infrequently taken in tablet form, and he submits the following facts for consideration. There are three types of tablet; the type which disintegrates in the mouth so that it has no advantage, so far as taste goes, over the powder; the type, not uncommon on the Ivory Coast, which is incommoded neither by hitting it with a hammer, nor by keeping it in water, or even dilute hydrochloric acid for three years with a daily shake; and the type of intermediate durability which is used in the French Colonies. One of this last type, containing 0·25 gm. of quinine, was administered to each of 44 persons who were without gastro-intestinal trouble, whose urine was tested 6 and 24 hours after ingestion by Tarnet's reaction, and whose stools were washed. Only 5 of them gave chemical evidence of urinary excretion of quinine, in 22 the tablet was recovered from the faeces intact or in a serviceable condition, while in 3 more it had been partly disintegrated. In a subsequent test with quinine solution of the same amount all these 44 persons gave the Tarnet reaction 6 hours after ingestion. Other experiments by Kerozoré under the orders of the Chief Medical Officer, showed that when 2 gm. of quinine in tablet form were ingested, 4 cgm., or 2 per cent. only, was eliminated in the urine during 24 hours.

C. L.

Atkey (O. F. H.) & Grantham-Hill (C.). **Preliminary Note on the Use of Novarsenobillon as a Prophylactic against Malaria in Areas where Heavy Infection is Unavoidable.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 61–63.

Of the railway staff between Wad Medani and El Obeid in the Southern Sudan, 36 out of 50 suffered during 1919 from malaria and 15 were admitted to hospital. During 1920, 19 of a staff of 45 had 0·9 gm. of novarsenobillon, 26 acting as controls. Of the former, 1 had malaria but was not admitted to hospital; of the latter, 15 had malaria and 5 were admitted to hospital. During 1921, 250 [apparently 267] persons had 0·45 gm. of novarsenobillon in one injection; of these 156 resided at two large stations where proper observation was possible; the incidence among them was 17, or 3·5 per cent., whereas among 219 controls it was 50, or 9·5 per cent. In the other stations the admissions to hospital for fever and the cases of enlarged spleen were as follows:—In 1920, 37 and 61 in a staff of 313; in 1921, 9 and 29 in a staff of 369 of whom 111 had received 0·45 gm. of novarsenobillon. The rainy season of 1921 gave a precipitation of three times the normal. Diagnosis, if made at all by a medical man, was apparently clinical.

C. L.

Lemoine (G. H.). **Prophylaxie et traitement du paludisme.**—*Jl. de Méd. et de Chirurg. pratiques.* 1922. Aug. 10. Vol. 7c. No. 15. pp. 539–547

Pansini (Giovanni). **Atonia muscolare laringea in soggetto malarico.**—*Policlinico.* Sez. Prat. 1921. Dec. 12. Vol. 28. No. 50. pp. 1688–1689.

SLEEPING SICKNESS.

Cross (H. E.) & Patel (P. G.). **A Note on the Transmission of Surra by Ticks.**—*Department of Agriculture. Punjab. Veterinary Bull. No. 6 of 1921.* 3 pp. [Received Nov. 1, 1922.]

During their investigation of surra the authors reached the conclusion that the spread of surra is not solely due to winged and comparatively short-lived insects—*Tabanidae, Stomoxys calcitrans*, fleas—but that those insects or arthropods which can survive for over a year may also play some part in the spread of the infection. It has been observed that :—

1. Surra breaks out frequently in the same district and stables though, so far as could be ascertained, the disease had not been imported into that district.

2. In one outbreak of surra the disease first made its appearance among ponies kept in a certain stable. For two years this stable was not used ; two years later, when ponies were again placed in this stable, cases of surra appeared.

In the Punjab only one species of *Ornithodorus* is known, viz., *O. lahorensis*, whilst another species, *O. savignyi*, has been recorded from Gujrat district, Bombay Presidency, Central Provinces and Madras Presidency. During a fly survey the authors found a tick resembling *O. lahorensis*, which Brumpt determined to be a new species and named *O. crossi* ; this species was found in large numbers in the Murree Hills.

Sixteen transmission experiments were carried out with this new species of tick. The ticks were first fed on camels, the blood of which contained numerous trypanosomes ; some of the ticks were interrupted in the middle of their feed and after an interval of 1 to 20 minutes allowed to finish their feed on healthy animals ; the other ticks were allowed to complete their feed on the infected camel and then, after intervals varying from 5 to 22 days, were placed on healthy animals ; in no case was surra transmitted. Those ticks which had had an interrupted feed, and were allowed after 1 to 20 minutes to finish their feed on healthy animals, were again fed on healthy animals 34 days later, but no infection resulted. The maximum number of ticks used in these experiments was 18 and the minimum 5.

Ten ticks failed to infect a healthy animal 46 days after the infected feed ; after a further interval of 21 days these ticks (both those which had had interrupted and uninterrupted feeds, 42 in number) and two *O. lahorensis*, which had 22 days previously fed on infected animals, were fed on a healthy rabbit and 10 days later trypanosomes appeared in its blood. In view of this surprising result the *O. crossi* (36 in number) were fed after a further interval of 16 days on a healthy rabbit and the two *O. lahorensis*, after an interval of 14 days, on a healthy rat ; the rabbit became infected, but not the rat. The 36 *O. crossi* were again fed, 18 days later, on another rabbit which also became infected.

From this it follows that the ticks *O. crossi* transmitted the disease to rabbits, 67, 83 and 101 days after the infected meal. Further details require to be worked out. The fact that *O. crossi* is capable of transmitting surra after a long interval may explain why the disease breaks

out yearly or periodically in the same stables and in the same district; though so far as can be ascertained cases of surra have not been imported into these stables or districts.

W. Yorke.

Hoare (Cecil A.). **Trypanosomiasis in British Sheep. Preliminary Communication.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June 22. Vol. 16. No. 3. pp. 188–194. With 11 figs.

The author examined the blood and made blood cultures in broth from about 50 sheep in Hertfordshire. All were infested by keds. The blood films were invariably negative, but the cultures revealed the presence of trypanosomes in 80 per cent. of the animals. It is well known that the sheep-ked (*Melophagus ovinus*) is nearly always infected with the flagellate known as *Crithidia melophagia*. In order to prove beyond doubt that the ked transmits trypanosomes to sheep, the author performed experiments on three new-born lambs, the blood of which was found to be free from parasites by a number of blood cultures. In the first experiment, 200–300 keds from an infected sheep were placed on one of the lambs. Blood films made every day were negative; the first culture was made a week after the experiment commenced and seven days later was found to contain trypanosomes, thus proving that the sheep trypanosome was transmitted by the ked.

With regard to the manner in which the ked infects the sheep, two methods appeared possible—(1) through the bite of the ked and (2) by the sheep eating or crushing the keds and thus liberating the flagellates which penetrate into the blood from the mucous membrane or through an abrasion of the skin. The latter method appeared more likely, and to prove it the contents of the abdomen of 50–60 keds, thoroughly mashed up in saline, were introduced into the second clean lamb *per os*. After 18 days trypanosomes were found in the blood and appeared also in cultures.

In order to ascertain whether trypanosomes can be transmitted by the bite of the ked, about 160 keds removed from an infected lamb and starved for 24 hours were allowed to bite a third clean lamb through gauze. The result was negative, showing that sheep can be bitten by infected keds without acquiring infection.

The investigation of the trypanosome in the ked's gut is not yet complete, but the facts so far obtained show that the parasite, which is present in the form of a Crithidia in the mid-gut of the ked, is transformed into a small trypanosome in the hind-gut, the walls of which are lined with this form, and which is undoubtedly the infective stage taken up by the sheep. This is at variance with Kleine's statement that the flagellates found by him in the proboscis are the important factor in transmission.*

Cultures obtained from the insect and also from the sheep's blood were maintained for nearly a year. They will not grow beyond 30° C. and will not develop in the N.N.N. medium. Attempts to infect sheep and laboratory animals by inoculation of the cultures failed. The trypanosome does not appear to have any pathogenic effect under ordinary conditions.

According to the rules of zoological nomenclature, the sheep trypanosome and the Crithidia of the ked now bear the name of *Trypanosoma melophagium*.

W. Y.

* *Deutsch. tierärztl. Woch.* 1919. Vol. 37. p. 408.

Carpenter (G. D. Hale). With note by Wiggins (C. A.). **Report of Senior Medical Officer in charge of Sleeping Sickness for 1920-21.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1921.* pp. 90–95.

The author gives information concerning an extensive tour of the sleeping sickness area of Uganda made by him. The islands of Bulago and Kimmi (Victoria Nyanza) were visited to initiate what it is hoped will be an adequate test of the method of attacking Glossina by enticing it to deposit larvae in artificial breeding-places where the pupae can subsequently be searched for and destroyed. The main object of the tour was to ascertain the amount of sleeping sickness, whether any portion of the large areas now closed could be opened under permits, and whether the boundaries of the closed areas might not in places be modified. In the Katwe area, 1,226 people were examined, and three new cases of sleeping sickness found. In the Mpologoma area 2,093 people were examined in Busoga, and no new cases were found, while in Bukedi five new cases were found amongst a population of 14,913. In the Siroko Valley area, 1,027 people were examined, but no cases were found. In the Toro sleeping sickness area, endeavours to collect natives for examination failed. In the Waki area one case of sleeping sickness was found, and in the Madi and West Nile districts 255 cases were found amongst 33,553 people examined.

In each instance the action taken on the report is summarized.

An outline is given of future work, and sundry recommendations are made.

W. Y.

Luisi. **La trypanosomiase humaine au Togo Français.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. June. Vol. 3. No. 16. pp. 92–102.

The opinion is expressed that the Germans over-estimated the importance of sleeping sickness in Togoland. In his researches into the epidemiology of the disease, Luisi has concerned himself mainly with (1) the density of the infection ; (2) the degree of contagiousness ; and (3) the coefficient of mortality.

Sleeping sickness seems to have appeared in Klouto for the first time about 1850. In 1903–04, Hintze and Krueger commenced to catalogue systematically the origin and number of cases which they had to treat. In 1908 Hellen examined 27,000 natives and found only 80 cases of the disease. In a table the geographical distribution of these cases is given, showing that they were widely disseminated, in equal degree, all over the district of Klouto. From these facts Luisi concludes that the disease has spread with extreme slowness and has exhibited but a slight degree of contagiousness.

In 1910 the figures of the German sleeping sickness commission show that there were in Togoland 262 cases of the disease, and that of these 53 came from the Klouto district. In a table the German statistics for 1913 and 1914 are given ; this period was one of intense activity of the German anti-trypanosomiasis work. It is seen that during this period there were 83 fresh cases admitted to the Misahohe camp, and that they all came from the Misahohe district, the disease being apparently non-existent in the other districts of Togoland. To speak of such a state of things as a "social scourge" is unbounded exaggeration.

W. Y.

Lonjarret. **La trypanosomiase humaine dans le territoire du Togo.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1922. Jan.–Feb.–Mar.–Apr. Vol. 20. No. 1. pp. 18–21.

Notwithstanding the most patient investigations, in which the whole native population of Togoland was examined, only 342 cases of sleeping sickness had been found by the Germans up to the middle of 1914. Lonjarret agrees that it is an exaggeration to apply the term "social scourge" to a disease which involves so small a number of victims. Its importance is trifling compared with that of syphilis, which really merits the name "social scourge," as it is slowly but surely destroying the race. Lonjarret adds that, although trypanosomiasis is not a very serious problem, it would be a great mistake to ignore it, and concludes by enumerating certain measures which he thinks should be taken.

W. Y.

'S Heeren. **Rapport sur la Mission de la maladie du sommeil de l'Uele.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 83–110. With 1 map in text.

The following are the conclusions :—

The observations recorded in the course of this report show that one can strangle sleeping sickness by therapeutic means. Analogous observations have been made in the French Congo.

So far as the territories of the Bas-Uele are concerned, the last sleeping sickness census shows clearly that in those regions where medicinal measures have been continued since 1914, *e.g.*, Ibembo, Monga, Yakoma, the disease is in full retrogression ; in those regions where medicinal prophylaxis and medical supervision have been interrupted owing to the war the disease has progressed.

In order to strengthen the action of medicinal prophylaxis and to prevent the extension of the disease by movements of carriers of the virus and consequent infection of natives in regions at present free administrative measures must be intensified.

The districts of Gwane and Bili should be provisionally closed to commerce.

The doctors in charge of the prophylactic work should be given limited penal powers, and when they are in charge of hospitals these powers should be further extended.

W. Y.

Archibald (R. G.). *Trypanosoma rhodesiense* **in a Case of Sleeping Sickness from the Sudan.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 339–340.

Three cases of sleeping sickness were brought to Khartoum from Tembura in Bahr-el-Ghazal Province of the Sudan. Two months previously trypanosomes had been found in the gland juice of all the cases, and each had been given two injections of 0·5 gm. of atoxyl. Gland puncture at Khartoum was negative, and it was decided to inoculate three healthy gerbil rats with the gland-juice obtained from one of the patients, who showed evidence of somnolence, marked enlargement of the lymphatics of the neck and axilla, and slight pyrexia. After 66 days one of the rats showed an intense infection,

and stained preparations of its blood showed posterior nuclear forms. Further details will be published later, but it can be said that the morphological characters of the trypanosome and its pathogenicity justify the conclusion that it is *T. rhodesiense.*

W. Y.

Taliaferro (W. H.) & Taliaferro (L. G.). **The Resistance of Different Hosts to Experimental Trypanosome Infections, with Especial Reference to a New Method of Measuring this Resistance.** —*Amer. Jl. Hyg.* Baltimore. 1922. May. Vol. 2. No. 3. pp. 264–319. With 18 figs.

The authors summarize their results as follows :—

"1. The conclusions reached in this paper are based on the study of 13 experimental infections with trypanosomes, divided as follows : *T. lewisi* in the rat (2), *T. equiperdum* in the rat (1), *T. equinum* in the rat (1), *T. brucei* in the dog (1), mouse (1), and guinea-pig (1), and *T. rhodesiense* in the rat (3), mouse (1), dog (1), and guinea-pig (1). In the study of these infections determinations of the number of trypanosomes per cmm. of blood were made on 125 days, and drawings, measurements, and computations of statistical constants were made for 114 sets of 100 trypanosomes each.

"2. The resistance which a host builds up toward a trypanosome infection may do one or both of two things : (*a*) it may retard the rate of reproduction of the parasites, or (*b*) it may destroy the parasites after they are formed.

"3. These two conditions can be differentiated by ascertaining : (*a*) the changes in the number of parasites per cmm. of blood, supplemented by (*b*) the changes in the coefficient of variation for total length of the trypanosomes, which gives a comparative measure of their rate of reproduction, irrespective of the number destroyed in consequence of the resistance. These two determinations differentiate between the two types of resistance because :

> The number of trypanosomes per cmm. of blood = the number produced by reproduction of the parasites—the number destroyed in consequence of the resistance.

"4. The validity of the coefficient of variation for total length, as a measure of the rate of reproduction of trypanosomes, is discussed in detail on page 305. Its great value lies in the fact that it measures the rate of reproduction irrespective of the number destroyed by the resistance.

"5. Three conditions have been found in regard to the resistance to trypanosome infections.

"(*a*) In the non-pathogenic *T. lewisi* in the rat, there is a resistance built up which is directed both toward a retardation of the rate of reproduction of the parasites, and toward their actual destruction after they are formed (rats 105 and 116).

"(*b*) In the continuous infections : *T. rhodesiense* (with the exception of the long infection in rat 709), *T. brucei*, *T. equiperdum* in the rat, and *T. brucei* and *T. rhodesiense* in the mouse, there is no evidence of any resistance being built up, either toward the rate of reproduction or toward the destruction of the parasites, after they are formed. In two of these infections (rat 619 and rat 703) there is some evidence that the rate of reproduction of the parasites increases as the infection progresses (rats 703, 705, 709, and 619, and mice 728 and 724).

"(*c*) In the relapsing infections : *T. equinum* in the rat, *T. rhodesiense* and *T. brucei* in the dog and guinea-pig, the host builds up a resistance directed toward a destruction of the parasites, after they are formed, but it does not affect the rate of reproduction of the remaining parasites (rat 729, dogs 713 and 714, and guinea-pigs 719 and 721)."

W. Y.

Noc (M.) & Baury. **Étude biologique du liquide céphalo-rachidien dans un cas de trypanosomiase humaine.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. July. Vol. 2. No. 7. pp. 190–193.

The case on which this paper is based was that of a patient in the native hospital at Dakar. Trypanosomes were found neither in the centrifuged blood nor in the gland-juice. Spinal puncture showed that the tension was normal; the fluid was clear and transparent, but, on centrifuging, scanty trypanosomes were found. Punctures made two days later provided fluid of the same characters. The leucocytes were increased in number—about 300 per cmm. The following was the leucocyte formula:—

	Per cent.
Polynuclear leucocytes	15
Lymphocytes	20
Transitional mononuclears	23·3
Large mononuclears	38·3
Eosinophiles	3·3

An abundance of mononuclear leucocytes is a sign of great value in the diagnosis of trypanosomiasis complicated by a cerebral invasion, and in cases where trypanosomes were not found suggests trypanosomiasis rather than syphilis.

Examination of the cerebrospinal fluid for albumen gave an abundant precipitate. The quantity of glucose was normal. Bile pigment was absent, as were also acetone and diacetic acid.

The cerebrospinal fluid haemolysed strongly the erythrocytes of the sheep; the fixation reaction with syphilitic antigen was positive. The authors were of opinion that cytological and chemical examination of the cerebrospinal fluid should be made during treatment, as they would furnish precise information of its value in each particular case.

Heckenroth, who took part in the discussion, refers to the work of Blanchard and himself [this *Bulletin*, Vol. 3, p. 251]. In their observations on 64 patients they examined the cerebrospinal fluid, firstly, from the point of view of protective antibodies, which were found to be absent in 10 cases, and, secondly, from the point of view of haemolysins, which were absent in 17 cases examined. They also found that in 37 patients in various stages of the infection the meninges were impermeable to potassium iodide, that in 4 patients they were impermeable to atoxyl, in 2 to tartar emetic, and in 4 to salvarsan.

W. Y.

Stevenson (A. C.). **Demonstration of Sections showing *Trypanosoma gambiense* in the Brain Substance of a Case of Sleeping Sickness.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June 22. Vol. 16. No. 3. p. 135. With 1 plate.

Trypanosomes were demonstrated in sections of the brain of a case of chronic sleeping sickness; they were most easily found in the frontal lobe, but were also seen in the pons and medulla oblongata; they were rather more frequent in the white matter than in the grey.

W. Y.

i. Nogue. **Note sur le fonctionnement de la polyclinique de l'hôpital indigène de décembre 1918 à juillet 1919.** —*Bull. Soc. Méd. Chirurg. française de l'Ouest-Africain.* 1919. Oct. Vol. 1. No. 3. pp. 28–33.

ii. ——. **Un cas de trypanosomiase avec mouvements choréoathétosiqués et incoordination cérébelleuse très marqée.** *Ibid.* 1920. July. Vol. 2. No. 7. pp. 196–197.

iii. —— & Jouenne. **Un cas de trypanosomiase intéressant par le lieu possible de la contamination.** *Ibid.* Dec. No. 10. pp. 289–290.

i. The author records that 15 cases of sleeping sickness came under observation at Dakar during the period in question. Pruritus seemed to be a symptom of greater importance than is usually considered, and appeared to be a constant symptom in non-treated cases. Other symptoms which have not hitherto been recorded, or only rarely so, are referred to. One patient exhibited continual athetosis of the right hand and later paralysis of the right arm and leg. Testicular insufficiency was noted in a boy of 15 years of age, and was characterized by infantilism and by abnormal development of the breasts, buttocks, and subcutaneous adipose tissue. Instead of the usual tachycardia, pronounced bradycardia was observed in one case.

ii. The details are given of the symptoms exhibited by a case of sleeping sickness, in the cerebrospinal fluid of which trypanosomes were found, but not in the blood. The most interesting symptoms were :—

1. Incessant movement of the face and arms.
2. Extremely pronounced cerebellar inco-ordination.

The speech was very slow and jerky ; intelligence was relatively slightly impaired ; the memory was fairly good ; the patient slept but little during the day, and the general condition was fair.

iii. Nogue and Jouenne give brief details of a case of sleeping sickness in a girl, aged 12 years, who was born in Dakar and had never left it, except to go to Médina, a village less than a mile away.

In the discussion Heckenroth points out that tsetse have never been found in Dakar or Médina, and considers that there are two possible ways in which infection may have occurred : first, by the bite of a stray infective Glossina carried into the town by the train from the region of Sangalcam, 25 kilometres away ; or, second, mechanically, from another case of sleeping sickness (cases frequently visiting Dakar for treatment, etc.) by means of mosquitoes.

W. Y.

i. Mayer (Martin) & Zeiss (Heinz), with Giemsa & Halberkann. **Weitere Beobachtungen ueber das Verhalten des neuen Trypanosomenheilmittels " Bayer 205 " im Blute.** [Further Observations on the Behaviour of the New Trypanosome Remedy, " Bayer 205," in the Blood.]—*Archiv. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 5. pp. 140–146.

ii. —— & Menk (W.). **Beitrag zur Behandlung der Schlafkrankheit mit " Bayer 205 " und dessen Verhalten im menschlichen Körper.** [The Treatment of Sleeping Sickness with " Bayer 205 " and its Behaviour in the Human Body.]—*Ibid.* No. 7. pp. 208–212.

iii. ——. **Ueber Resorption und Wirkung des Trypanosomenheilmittels " Bayer 205 " bei innerlicher Behandlung.** [The Absorption and Action of " Bayer 205 " after Oral Administration.]—*Ibid.* No. 8. pp. 237–243.

i. In previous communications [this *Bulletin*, Vol. 19, pp. 133 and 508], Mayer and Zeiss have shown, by means of biological tests, that " Bayer 205 " circulates in an active form for prolonged periods in the

blood. The present investigation was undertaken to ascertain whether the drug was bound up with the blood proteins. The point was examined firstly by the method of ultra-filtration, using the apparatus devised by Giemsa, and secondly by the method of precipitation of the proteins. The conclusion reached is that " Bayer 205 " in the serum is bound up with the proteins, and especially with the albumen.

ii. Details are given regarding the treatment of a patient infected with *T. gambiense*. The disease was contracted in December, 1920, in the Belgian Congo. Notwithstanding treatment with atoxyl, soamin, tartar emetic, and salvarsan, the disease progressed and trypanosomes were present in the blood on March 28, 1922. On March 30 and 31, and April 3 and 8, 1 gm. of " Bayer 205 " was given intravenously. The last trypanosomes were seen 12 hours after the first injection. The only untoward symptoms noted were a cutaneous eruption, which became in places pustular, and some albuminuria accompanied by casts and epithelial cells. The author points out that the observation period is as yet too short to allow of conclusions, but the general condition of the patient on June 29, when he returned to the Congo, was good and the albuminuria had disappeared.

By means of biological tests it was found that the urine was active 12 days after the last injection of " Bayer 205," and the serum 13 days after.

A dose of 2 gm. of " Bayer 205 " was given orally to a case of tabes. Six hours later albumen appeared in the urine ; the amount of albuminuria was greater than after intravenous injection, but it disappeared sooner.

iii. Two goats infected with *T. rhodesiense* were treated orally with " Bayer 205." The first was given 20 gm. of the drug within six days, five weeks after infection, when it was in a grave condition ; trypanosomes disappeared quickly from the blood and the animal rapidly recovered condition and has remained well, with negative blood, for seven months. The second was given 2 gm. of the drug five weeks after infection ; the blood became negative, but a relapse occurred a month later, when another 5 gm. of the drug was given by the mouth ; the blood again became negative and remained so for four days, when 3 gm. of the drug was given subcutaneously ; death occurred and was attributed to the action of the drug.

Another goat was protected against infection with *T. rhodesiense*, and a dog against *T. brucei*, by previous feeding with " Bayer 205 " ; the goat received 20 gm. of the drug at one dose a week before inoculation, and the dog a dose of 1 gm. on each of three consecutive days, 14 days before inoculation.

Details of a considerable number of experiments are given, showing that the serum of the infected goats withdrawn several weeks after oral treatment with " Bayer 205 " had a definite therapeutic action in mice infected with *T. equinum, T. brucei, T. equiperdum.*

The milk of the goat fed with " Bayer 205 " was found to exert a prophylactic action when given to mice which were subsequently inoculated with *T. equinum.*

A goat was given orally 60 gm. of " Bayer 205 " between March 22 and 29, 1922. It gave birth to young on April 2. On April 8 and April 19 blood was withdrawn from each of the two young animals and examined biologically. The results, which are given in a table, showed that the serum of one of the young exerted some therapeutic

action in the case of a single mouse, suggesting that it contained traces of "Bayer 205." Twenty-four days after birth, this young goat was inoculated with *T. rhodesiense*, but became infected and died in the ordinary way.

W. Y.

Brumpt (E.) & Lavier (G.). **Mode d'action du "Bayer 205" sur divers hématozoaires: Trypanosomes, Piroplasmes, Theileries, Anaplasmes.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 613–621. With 1 text fig.

The drug was not observed to exert *in vitro* any action on *T. rhodesiense* and *T. venezuelense*. Therapeutic experiments conducted on mice and rabbits infected with *T. brucei*, *T. rhodesiense* and *T. venezuelense* gave satisfactory results similar to those already recorded by the German workers and others. Prophylactic injections of 1 mgm. in a mouse prevented infection with *T. brucei* and *T. venezuelense* 3 days later, with *T. venezuelense* 18 days later, and with *T. brucei* 16 days later, but a dose of 1 cgm. did not protect a mouse inoculated with *T. brucei* 26 days later, although the evolution of the disease was retarded.

The authors succeeded in reinfecting with the same virus two mice which had been cured of *T. venezuelense*. The first was inoculated on March 21 and treated four days later with 1 mgm. of "Bayer 205"; the second was inoculated on March 25 and treated four days later with 2 mgm. of the drug. Both animals were reinoculated on May 25; the second showed trypanosomes on May 27 and died on May 31, whilst the first also was found to be infected on May 27, but death did not occur until 23 days later.

The drug had apparently no action on *Theileria mutans* or *Anaplasma bovis*, nor did it have any effect on the course of the infection in a dog inoculated with *Piroplasma canis*.

W. Y.

i. van den Branden & van Hoof. **Essais du silbersalvarsan et du sulfarsénol dans la trypanosomiase humaine.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 125–130.

ii. —— & ——. **Le "Stibényl" (acétyl-p-aminophényl stibiate de soude) dans la Trypanosomiase humaine.**—*Ibid.* pp. 37–41.

iii. van den Branden (F.). **Sels de bismuth dans la trypanose humaine et le pian. Cacodyline dans le trypanosome humaine. (Communication préliminaire.)**—*Bruxelles-Médical.* 1922. Aug. 15. 2e année. No. 20. pp. 507–508.

iv. ——. **La méthode Marshall dans le traitement de la maladie du sommeil.**—*Ibid.* Jan. 1. 2e année. No. 5. pp. 119–120.

i. Reference is made to earlier work of van den Branden on the treatment of sleeping sickness patients by one dose of salvarsan, neosalvarsan, copper salvarsan and the sodium salt of copper salvarsan [this *Bulletin*, Vol. 7, p. 105; Vol. 16, p. 369]. Details are given of three cases which have not relapsed within five years after a single injection of neosalvarsan—0·75 gm. in the first case, copper salvarsan 0·2 gm. in the second, and the sodium salt of copper salvarsan 0·3 gm. in the third.

The conclusion is drawn that a single injection of the above drugs may exceptionally produce a definite cure.

In a table are given the results of treating five cases of sleeping sickness with silver salvarsan, which contains 12·7 per cent. of silver and 21·5 per cent. of arsenic. It was found that silver salvarsan did not exert a trypanocidal action superior to that of the above-named salvarsan compounds, or, in other words, that the combination of silver with the arsenical salt did not increase its therapeutic value.

The value of a new arsenical preparation, "sulfarsenol," was examined in a number of cases and was found to be equal to that of neosalvarsan. [In another paper it is stated that sulfarsénol is "le sel de sodium de l'éther sulfureux acide du monométhylolamino-arsénophénol."]

ii. Three cases of sleeping sickness were treated by stibenyl. One of the patients disappeared after the second injection; of the other two cases one has relapsed. The authors state that it appears to them that the drug is not likely to supplant tartar emetic.

iii. Tartrobismuthate of sodium and potassium suspended in oil was injected into the gluteal region in three cases of sleeping sickness. In the first case three injections were given at intervals of about four days, each injection consisting of 3 cc. (0·3 gm. of the drug). Trypanosomes did not disappear from the gland-juice until five days after the last injection. In the second case five injections of the same dose were given within 21 days without obtaining any definite peripheral sterilization. In the third case three injections were given. Trypanosomes were present three days after the last injection, but were absent for the following seven days.

Cacodyline, which the author states is well tolerated and allows of the introduction of a considerable quantity of cacodylate into the organism, was tried on two infected natives. The conclusion is that the drug is of no use in the treatment of sleeping sickness.

iv. Up to the time of writing, 18 cases of sleeping sickness had been subjected to Marshall's treatment [this *Bulletin*, Vol. 16, p. 368; Vol. 19, p. 141]. The results were not very encouraging, and details are given of eight cases in which no benefit was observed.

The salvarsanized serum did not appear to be irritating to the spinal canal, and the same applied to serum after injection of tartar emetic, atoxyl, soamin, silver salvarsan and galyl. The patients tolerated the injections well.

The conclusions are —

1. Intrathecal injection of salvarsanized serum is not a treatment of choice for sleeping sickness.

2. Apparently blood serum injected into the spinal canal does not result in cure, as Marshall believes, owing to its trypanolytic properties.

W. Y.

Browning (C. H.) & Gulbransen (R.). **An Interference Phenomenon in the Action of Chemotherapeutic Substances in Experimental Trypanosome Infections.**—*Jl. Path. & Bact.* 1922. July. Vol. 25. No. 3. pp. 395–397.

A parafuchsin-resistant strain of nagana "ferox" was obtained by feeding mice for prolonged periods with amounts of the drug insufficient to cause complete sterilization. The resistance of the strain was proved by inoculation into normal mice and those saturated with parafuchsin, both becoming infected in a similar manner.

It was found that the susceptibility of infections with the parafuchsin-resistant strain to treatment with aminoacridin compounds was manifested only when the inoculated animals were fed with ordinary food. When animals fed with parafuchsin were similarly inoculated with the strain resistant to parafuchsin and were then treated by an injection of acridin compound, the therapeutic effect of the latter was much diminished. Details are given in a table.

The authors consider that the expression "therapeutic interference" is appropriate for this phenomenon. Parafuchsin by combining with the protoplasm of the trypanosomes resistant to this drug protects the parasites from the harmful action of the acridin compound. According to this view both chemical substances (or the trypanocidal agents elaborated from them in the tissues) should combine with the same haptophore groups of the trypanosome protoplasm. The authors add, however, that the phenomenon appears only to be partially accounted for in this way.

W. Y.

Voegtlin (Carl) & Miller (D. W.). **The Relative Parasiticidal Value of Arsphenamine and Neoarsphenamine. With a Description of the Trypanocidal Test.**—*Public Health Rep.* 1922. July 7. Vol. 37. No. 27. pp. 1627–1641.

In this paper the authors describe in detail experiments conducted with the object of determining the relative parasiticidal value of arsphenamine and neoarsphenamine [this *Bulletin*, Vol. 17, p. 332; Vol. 19, p. 143]. Their experiments were conducted on albino rats infected with *T. equiperdum*. Details are given in eight tables.

The conclusions are as follows:—

"1. The results obtained in this investigation confirm previous data from this laboratory to the effect that arsphenamine of different manufacture is fairly uniform in parasiticidal power, whereas neoarsphenamine shows great variations.

"2. The toxicity of the average commercial arsphenamine and neoarsphenamine manufactured at the present time is considerably lower than that of preparations found on the market two years ago.

"3. The technique of the trypanocidal test as elaborated in this laboratory during the last few years is described in detail."

W. Y.

Nusshag (W.). **Ein Beitrag zur Übertragungsweise der Beschälseuche.** [The Mode of Transmission of Dourine.] *Deut. tierärztl. Woch.* 1921. pp. 482–483.

The author considers possible means of transmission of dourine besides the usual sexual method, but is of opinion that these must be of rare occurrence.

Since the vast majority of the 148 dourine-infected Thuringian horses were kept in close contact with healthy animals, there was ample opportunity for spread of the disease, but, with only two exceptions, the origin of the infection was in all cases traced to coitus with an infected beast.

Details are given concerning the infection of two foals, the progeny of mares which were healthy at the time the foals were born, but which were shortly afterwards infected by dourine stallions. Possibly the foals were infected from the milk of the mothers [see this *Bulletin*, Vol. 17, p. 335–7].

W. Y.

Bessemans (A.) & Leynen (E.). **Valeur antigénique de certains Spirochètes et de différentes souches de Trypanosomes pour le diagnostic de la dourine chez les Equidés par la réaction de Bordet-Gengou.**—*C.R. Soc. Biol.* 1922. July–Sept. Vol. 87. No. 28. pp. 797–800.

In this work the authors examined the antigenic value of four strains of *Treponema pallidum*, of two strains of *Spirochaeta icterohaemorrhagiae*, and of three species of trypanosomes, viz., *T. rhodesiense*, *T. lewisi*, and a bird trypanosome.

It was found that if it is desired to obtain antigen from heavily infected blood of a guinea-pig, it is best to use parasites of the first infection and not those of relapses.

The serum of dourine horses does not deviate complement with *Treponema pallidum* or with *Spirochaeta icterohaemorrhagiae*, but it does so well with the different species of trypanosomes. This confirms the view that the reaction is only specific for the genus *Trypanosoma* and not for the species *equiperdum*. The authors' experience was that *T. equiperdum* did not necessarily exercise the greatest antigenic power, certain strains proving less active than strains of *T. brucei* and *T. evansi*.

W. Y.

Reynolds (Francois H. K.) & Schoening (Harry W.). **The Precipitation of Colloidal Gold in the Cerebrospinal Fluid of Horses with Dourine.**—*Jl. Infect. Dis.* 1922. July. Vol. 31. No. 1. pp. 59–63.

The following summary is given :—

"The colloidal gold test, when applied to the spinal fluids of horses suffering with dourine, in many instances gives reactions of varying intensity. A number of the reactions are similar to those in cases of cerebrospinal syphilis in which the peak of the curve is found at about the centre of the scale. In some instances, the reactions recorded attained a height of 5. In other cases the reactions showed a tendency to rise and stopped abruptly at 1, 2, and 3, then dropped to zero. This suggests the possibility that a more energetic curve might have been attained had the disease progressed to a greater degree before the destruction of the animal. Some of the curves are similar to those in meningitis, while no reactions of the paretic type were obtained.

"While reactions were obtained with the colloidal gold test, just what they may indicate cannot now be stated in the absence of careful study of the spinal cords. However, in the presence of a positive serum test and in some cases of clinical evidence, it would appear that the reactions would be of some significance.

"In many cases there appeared to be no agreement between the serum fixation, fluid fixation, and the globulin and colloidal gold tests; but when consideration is given the active campaign against this malady and the rapid destruction of animals reacting to the serum fixation tests, and the remote chance of the disease progressing to any great length, it is not surprising that so few reactions to the fixation tests were obtained with spinal fluid. The apparent absence of globulin in many cases is not so disconcerting, as the test employed may not have recorded its presence sufficiently to make it discernible macroscopically; further, other proteins, not detected by the method at hand, may have influenced the colloidal gold reactions.

"Several specimens of spinal fluid gave the complement-fixation test for dourine."

W. Y.

ZANDBERGEN (K.). **Trypanosomen en lage temperaturen.**—*Tijdschr. v. Vergelijkende Geneesk. enz.* 1922. Aug. 5. Vol. 7. No. 4. pp. 236–240. [French & English summaries. pp. 240–243.]

In this paper the author records further observations on the effect of low temperatures on various trypanosomes [this *Bulletin*, Vol. 19, p. 516]. When kept in the ice-box (or at 4–8° C.), *T. lewisi* remained motile for 50 days and infective for 43 days, *T. evansi* motile for 5 days and infective for 4 days, *T. equiperdum* motile for 5 days and infective for 2 days, *T. venezuelense* motile for 4 days and infective for 3 days, and *T. brucei* motile for 3 days and infective for 3 days. At −20° C., *T. lewisi* were fully motile after 1⅛ hours but no longer infective, *T. evansi* motile after 2½ hours but not infective, *T. equiperdum* not motile after 2⅛ hours and not infective after 3¼ hours, *T. venezuelense* doubtfully motile after 2¼ hours and not infective after 3 hours, and *T. brucei* motile after 2¾ hours and infective after 3¾ hours. At the temperature of liquid air (−190° C.) *T. lewisi* were motile and infective after 1 hour, *T. evansi* motile, but not infective, after 9–17 minutes, *T. equiperdum* motile and infective after 31 days, *T. venezuelense* motile after 30 days and infective after 60 days, and *T. brucei* motile and infective after 11 days.

W. Y.

TORRES (C. Magarinos). **Cultura do *Schizotrypanum cruzi*, Chagas, 1909 em meio liquido. Influencia da concentração dos ions de hydrogenio sobre a cultura. Verificação precoce do Shizotrypano no sangue.** [Cultivation of *S. cruzi* in a Liquid Medium. Influence of the Concentration of Hydrogen Ions in the Culture. Early Verification of *S. cruzi* in the Blood.]—*Brazil-Medico.* 1922. June 17. Year 36. Vol. 1. No. 24. pp. 317–319.

It is well known that *S. cruzi* can be cultivated on Novy-MacNeal medium; it has also been grown on ordinary broth, but in this case the development is inconstant, probably owing to variation in the reaction of the medium. In previous experiments it was found that broth containing NaCl to the extent of 7 per cent. and peptone 5 per cent. was most favourable; no growth took place in broth containing respectively 10 per cent. and 4 per cent. NaCl or in broth to which no NaCl had been added. The question of oxygen is also important, and it was found that cultures made in tubes sealed with vaseline quickly died, while those made in tubes not so sealed grew abundantly in 20–30 days, and would infect guinea-pigs after 49 days. The added blood is essential, the culture being most abundant on the surface of the red cells at the bottom of the tube.

In order to examine the influence of the hydrogen ion content, *S. cruzi* was inoculated into divers broths, the H ion concentration of which was determined electrometrically. The results are set forth in a table from which it is seen that the best development was obtained in broths in which Ph was between 6·55 and 7·18.

Notwithstanding the small quantity of infected blood introduced into the broth, the cultures in some tubes were very abundant—more so than those obtained on the solid medium of Novy-MacNeal.

The cultures remained alive for from 24 to 49 days and were infective for guinea-pigs after two to eight days. Guinea-pigs inoculated with cultures became infected more quickly than those inoculated directly with infective blood.

W. Y.

Glaser (R. W.). **A Study of** *Trypanosoma americanum.*—*Jl. Parasit.* 1922. Mar. Vol. 8. No. 3. pp. 136–144. With 4 plates.

The following summary is given :—

"*Trypanosoma americanum* was successfully grown in horse-blood medium and on the N.N.N. medium, as well as in cow-blood medium. Development in the culture media was traced, and the cytological details of the various stages described.

"*T. americanum* is specific to cattle. In freshly drawn blood and in very early cultures *T. americanum* resembles the majority of the forms found in 3 and 4 day old cultures.

"Morphological and experimental data are presented to show that *T. americanum* is structurally a Crithidium [*sic*]. Prolonged culture and environmental alterations have a tendency to produce herpetomonad types but never trypanosome types.

"Reasons are presented in support of the view that *T. americanum* is an intermediate evolutionary stage between true Crithidia and true trypanosomes. The name *Trypanosoma americanum* is retained."

W. Y.

Donatien (A.) & Parrot (L.). **Trypanosomiase naturelle du chien au Sahara (Note préliminaire).**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 549–551.

A natural infection of the dog with trypanosomes was found in the Sahara for the first time by Vialatte, in 1915, who noted that the parasite resembled very closely *T. berberum*. Later (1920), Delanoë found a natural infection in a dog in Morocco which he believed to be *T. marocanum*. The present note relates to a second case in the Sahara at Touggourt ; clinical details are given. The parasite was long and thin, the nucleus central, the blepharoplast small, the length without the flagellum 16 μ to 24 μ, and the length of the free flagellum 5 μ to 8·75 μ. Mice, guinea-pigs and rabbits are susceptible to infection.

The authors believe the parasite to be *T. berberum*.

W. Y.

van Saceghem (René). *Trypanosoma theileri* **au Ruanda.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 113–114.

T. theileri was frequently found in blood films of Ruanda cattle. The shape and size were variable ; the larger forms measured 46 μ in length by 2 to 3 μ in breadth, and the smaller forms 37 μ in length by 2 μ in breadth ; the nucleus is oval and displaced towards the posterior portion of the body ; the micronucleus is round and situated some distance from the posterior extremity, and is often marginal ; the free flagellum is very long and the undulating membrane broad and folded ; the cytoplasm stains deeply and contains large vacuoles, and the posterior extremity is extremely effilated. Cultures were easily obtained in bouillon to which defibrinated blood was added.

W. Y.

Leger (Marcel) & Baury (A.). **Trypanosome de l'Ecureuil fossoyeur du Sénégal,** *Xerus erythropus.*—*C.R. Soc. Biol.* 1922. June 17. Vol. 87. No. 22. pp. 133–134.

A description is given of a trypanosome found by the authors in the blood of a squirrel, *Xerus erythropus*, in the vicinity of Dakar. In the fresh state the parasite is very motile, but does not exhibit the translatory movement characteristic of *T. lewisi*. In stained preparations the trypanosome had the following dimensions: posterior extremity to the centrosome 6·5 μ, centrosome to nucleus 11 μ, nucleus 2·5 μ, nucleus to anterior extremity 7·5 μ, free flagellum 7·5 μ, greatest breadth 1·75 μ, and total length 33 μ to 36·5 μ. The large centrosome is generally rod-shaped, the nucleus is much nearer the anterior extremity. No divisional forms were seen, nor were any indications of multiplication seen in the cardiac muscle. Massive intraperitoneal inoculation into a white rat, mouse and guinea-pig were negative.

The parasite is obviously of the *lewisi* type, but differs in being non-inoculable into the rat; it closely resembles *T. eburneense* (Delanoë), and possibly future investigations may show that it is really this parasite, but in the meantime the authors propose for it the name *Trypanosoma xeri*.

W. Y.

Nieschulz (Otto). **Zur Kenntnis einiger Vogeltrypanosomen.** [Some Bird Trypanosomes.]—*Arch. f. Protistenk.* 1922. Vol. 45. No. 2. pp. 241–263. With 2 plates & 8 text figs.

The author examined German birds, and found them much more frequently infected with trypanosomes than is commonly supposed. Trypanosomes were found in the following nine species of birds—in six species for the first time :—

Anthus pratensis.	*Saxicola oenanthe.*	*Erithacus rubeculus.*
Erithacus phoenicurus.	*Sylvia simplex.*	*Muscicapa atricapilla.*
Phylloscopus trochilus.	*Turdus torquatus.*	*Turdus philomelos.*

The main portion of the paper deals in considerable detail with the morphology of the parasites as seen in preparations of the blood and of cultures in blood-bouillon, and must be consulted in the original by those interested.

The paper is illustrated by two plates and a number of text figures.

W. Y.

Franchini (G.). **Nouvelles recherches sur les trypanosomes des euphorbes et sur leur culture.**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 299–303. With 1 text fig.

This paper gives the results of the author's attempts at cultivation on Nöller's medium of trypanosomes obtained by him from various Euphorbiae. It was found that the parasite grew better in the substance of the medium than on the surface, and that it was cultivated with most difficulty in Yoshida's tubes.

Examination of the cultures, especially in the fresh state, showed that there exists a close relationship between the trypanosomes of Euphorbia and other large parasites (round or oval), sometimes exhibiting amoeboid movements and having the appearance of amoebae, which accompanied the trypanosomes. There probably exists an intracellular stage in the development of the trypanosome.

W. Y.

i. Fletcher (T. Bainbridge) & Senior-White (R.). **Surra and Biting Flies : A Review.**—*Report of the Proc. of the 4th Entom. Meeting held at Pusa on the 7th to 12th Feb., 1921.* pp. 222–235. With 1 plate.

ii. Neveu-Lemaire. **Les grandes endémo-épidémies africaines. La maladie du sommeil.**—*Presse Méd.* 1922. Oct. 18. Vol. 30. No. 83. pp. 1733–1739. With 4 text figs.

iii. Rosenthal (F.) & Freund (R.). **Ueber den Mechanismus des Trypanozidieschwundes bei leberkranken Menschen.** [The Mechanism of the Disappearance of Trypanocidal Substance in Men suffering from Liver Disease.]—*Klin. Woch.* 1922. Aug. 26. Vol. 1. No. 35. p. 1748.

i. In this paper, which contains nothing new, the authors summarize the present position of knowledge regarding the transmission and spread of surra.

ii. This paper contains a general account of sleeping sickness of a semi-popular nature.

iii. This short note summarizes the work previously published by Rosenthal, Krueger and Nossen, which has already received notice [this *Bulletin*, Vol. 19, pp. 154 & 520].

W. Y.

REVIEWS AND NOTICES.

WENYON (C. M.), ANDERSON (A. G.), MCLAY (K.), HELE (T. S.) & WATERSTON (J.). **Malaria in Macedonia, 1915 1919. Parts I–V.** —*Jl. Roy. Army Med. Corps*. 1921. Aug.–1922. May. 137 pp. 6 plates, 20 figs., 8 charts & 1 map.

The five reprints here collected in one volume give a connected account of the work of the Malaria Inquiry Laboratory established at Salonika during the military operations in Macedonia, the authors being the officers of the laboratory staff, of whom the commandant was Colonel C. M. Wenyon, whose most instructive contribution occupies more than half the volume of reprinted matter. The original papers have already been noticed individually in the *Bulletin* (Vol. 18, pp. 326–327; Vol. 19, pp. 277–278, 295, 570, 585, and 828), but their value, both from the scientific standpoint as a digested record of a great malaria epidemic rationally handled, and from the practical standpoint as a classical lesson in the double art of war against malaria in an enemy country, entitle them in their united form to something more than a mere perfunctory acknowledgment.

Colonel Wenyon starts with a brief retrospect, in which the pestilential character of the occupied country is vividly depicted and the old lesson thereby illustrated that the losses caused by the deadliest series of military engagements are as nothing compared with those resulting from an unhealthy military location.

The British line of occupation, which extended in a great curve from the mouth of the Struma to the lower courses of the Vardar, lay mainly in the valleys of a broken country encompassed by lakes and rivers and intersected by streams, a country of springs and trickling waters and areas of swamp, eminently hospitable to the genus damnatus, Anopheles. In the valleys *Anopheles maculipennis* predominated; in the hilly grounds *A. superpictus*. Native villages supplied the malarial infection, and when they were evacuated the infection was already confirmed in the army. In the latter half of 1916 the number of admissions for malaria was over 30,000. In 1917, although the worst cases had been removed from the country at the end of 1916 and vigorous antimosquito operations had been in progress from the beginning of the year, the number rose to 70,000, being at the rate of 4,500 a week in the early part of September. In 1918, although the number of troops in occupation had been reduced by two divisions and preventive measures intensified, the admissions for malaria were at the rate of 650 a week in January, rising gradually to about 1,500 a week in March, and rapidly increasing to the middle of June; the worst cases (about 25,000) were then systematically weeded out and sent away, and this resulted in a remarkable fall to between 1,000 and 1,600 a week up to the end of October, followed by a steady decline to 500 in the last week of December.

Colonel Wenyon describes succinctly all the preventive methods systematically and energetically employed—measures against mosquito larvae and their haunts, against adult mosquitoes and their attacks, and against the establishment of the parasite in the blood. "Decidedly disappointing" is his verdict upon antilarva measures in the particular circumstances of a campaign in a foreign country. As he says, it is impossible to deal with the entire country beyond the lines of occupation, and impossible to determine the range of flight of a host of mosquitoes. He doubts much whether antilarva measures had any general effect in diminishing the number of sufficiently active mosquitoes; he doubts still more whether they had any effect in diminishing the spread of actual infection; and he gives it as his deliberate opinion "that the mosquito net did more to prevent infection than all the other methods of malaria prevention together."

"Disappointing in results" is also Colonel Wenyon's verdict upon quinine as a prophylactic—a decision argued with sobriety and judgment. It is admitted that in certain circumstances individuals may be protected by quinine, but where infected mosquitoes are very numerous and exposure to their bites extends over a prolonged term, any such general protection is doubtful. The author, however, refers to the history of a detachment of 305 men temporarily encamped on a site (not in Macedonia) apparently so delectable that any precautions whatever against malaria were thought unnecessary. "Practically every man" of the 305 "had malaria within two months." In Macedonia, where under similar conditions of exposure prophylactic quinine was taken, there was never such a high incidence in so short a time; and this leads the author to surmise that there may be something to be said for quinine as a prophylactic after all.

The conclusion of the whole matter of malaria prevention in the circumstances of a campaign may be heard in Colonel Wenyon's own words:

"Looking at the whole campaign against the mosquito one cannot help feeling that under the conditions which actually prevailed in Macedonia—and this is probably true of any campaign in a highly malarious country—if all the energy and money expended had been directed entirely to the protection of men against mosquito bites the malaria would not have been more, but probably less, than it was. In the case of a campaign in a mosquito-infected land these measures alone, if thoroughly carried out, would give a greater degree of protection than if the labour and expense were divided amongst this and other methods, such as those of clearing, or quinine prophylaxis, which may be very useful in times of peace or permanent occupation but have proved disappointing in Macedonia in time of war.* The money expended on prophylactic quinine alone would have supplied thousands of mosquito-proof huts and hospital wards and almost unlimited quantities of necessary gauze. It would have given each man a separate mosquito net instead of compelling him to share with another and would have enabled these to be replaced at once when damaged—always supposing of course that the necessary materials could have been obtained, and they probably could have been if their necessity had been insisted upon. A sufficient supply of all these things should be regarded as part of the necessary equipment of an army entering a malarious country. A mosquito net to protect against the mosquito is as much a necessity as the sun helmet to protect against the sun."

. . . . . .

"For a campaign in a highly malarious country it seems to me that the following equipment should be at once available:—

"(1) Mosquito nets of two types: (*a*) Hospital nets of rectangular pattern with a calico strip round the base, (*b*) Bivouac type, in such numbers that each man may have a net at once and have it replaced immediately when damaged. If phlebotomus is known to occur, the mesh should be small—at least 22 holes to the linear inch.

"(2) Some form of standard mosquito-proof hut similar to those used in Salonika in 1918. They were made of wood, canvas, and copper gauze, and can be quickly put together. There should be a definite scale for the supply of these. They can be used as mess-huts for men and officers, and as hospital wards in place of tents, offices, etc. They protect, of course, against flies as well as mosquitoes.

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* In this connexion a paragraph from James' most interesting and opportune book on malaria ("Malaria at Home and Abroad," p. 199) is of interest:—

"Perhaps we must make allowances for the frailty of man as well as for the wiliness of the mosquito, but whether this is true or not, practical experience is to the effect that it is usually best to concentrate all available effort on one carefully selected method which can then be brought to a high degree of perfection."

" (3) Copper gauze to mosquito-proof buildings.

" These are far and away the most important, though minor appliances should not be forgotten. Such are :—

" (4) Mosquito boots, especially for officers and sisters.

" (5) Mosquito veils and gloves. The value of these is very limited.

" (6) Special clothing for the men, as, for example, turn-down shorts.

" (7) Some form of mosquito swat to enable men to kill any mosquitoes found in the rooms or tents in the morning.

" (8) Repellents, though these are of very limited use.

" (9) Sprayers and fumigators.

" (10) Pamphlets of a simple kind explaining the dangers of the mosquito and the reasons for the measures taken.

" In addition, there should be a staff consisting of experts whose sole duty it is to report at once on the malaria incidence and dangers in the various districts to be occupied and to suggest measures of prevention."

As already stated *A. maculipennis* and *A. superpictus* were the main carriers of infection. Both species hibernated as adult females, though from the fact that larvae of the first-named species can withstand being frozen in a block of ice the possibility of hibernating in the larva stage is conjectured. Hibernation is not synonymous with dormancy, since wintering females will feed if their shelter at any time becomes warm enough. Both species were about equally readily infected both with *Plasmodium vivax* and *P. falciparum*. The percentage of captured insects found to be naturally infected, even at the height of the malaria season, was only 1·5 per cent. The earliest discovery of a naturally infected *A. maculipennis* was May 11th, in the Struma valley; but at Lahannah seven individual *A. superpictus* were captured in winter with oocysts of quite normal appearance in the stomach-wall. This discovery re-opened the question of the possibility of malarial infection being carried from season to season, in a latent form, by hibernating mosquitoes; a question that was afterwards settled in the conditional affirmative by subsequent experiment, the proviso being that the winter temperature of the sheltering place must not be too low—for when mosquitoes with unripe cysts of *P. falciparum* were kept in the ice-chest for some days at a temperature constantly but a few degrees above freezing-point and were then restored to suitable warmth the cysts in all cases failed to ripen, but when such insects were kept at the ordinary winter temperature of the laboratory for 14 days the cysts developed after the insects were replaced in the incubator.

All the three familiar species of malaria parasites were met with in Macedonia; but the quartan parasite, though quite common among the native children was exceedingly rare among the troops. In the tabulated records of blood-films *P. vivax* and *P. falciparum* infections were about equal in number towards the end of the year (November); thereafter the number of *P. falciparum* fell and the number of *P. vivax* rose until March–May, when over 98 per cent. of the films showed *P. vivax*.

Colonel Wenyon offers a very simple explanation of the late seasonal appearance of *P. falciparum*. He argues that since the infection with *P. vivax* persists and relapses, while that with *P. falciparum* does not, there must be, at the very commencement of the malaria season, more human carriers of *P. vivax* than of *P. falciparum*, and consequently a preponderating infection of active mosquitoes with *P. vivax*, manifested by a corresponding preponderance of benign tertian admissions. Cases of *P. falciparum* infection, however, do occur as early in the season as May; but now, however, the facts must be taken into consideration (1) that gametocytes of *P. vivax* are much more vulnerable by quinine than gametocytes of *P. falciparum*, and (2) that *P. falciparum* in man produces gametocytes more quickly and abundantly than *P. vivax*; consequently as the malaria season progresses an increasing number of active mosquitoes must become infected with *P. falciparum*, and this will at last be manifested in a preponderant number of malignant tertian admissions.

The severity of malaria in Macedonia is not different from that of other malarious countries; primary infections also may be long latent; blackwater fever also is not uncommon, and Colonel Wenyon takes occasion to emphasize his opinion that, fundamentally, blackwater is a particularly extreme manifestation of that destruction of red blood cells which is the characteristic feature of malaria infections in general.

In discussing the morbid histology of malaria, Colonel Wenyon draws attention to two distinct types of fatal cerebral phenomena, though he does not assume that they are distinguishable clinically; in one class of cases the capillaries of the brain (and viscera also) are completely blocked by embola of infected cells, in the other class the capillaries are obstructed but are still to some extent permeable and among the obstructive cells few seem to be infected. He also, apropos morbid histology, makes some remarks on intramuscular injection of quinine. Here, while admitting the inevitable necrosis, and allowing that this interdicts the routine practice of the method, he concedes the point that since the after effects of necrosis are not necessarily serious there are cases where, when the administration per os fails to control fever, an intramuscular injection is permissible.

One of the most important and most informative sections of Colonel Wenyon's contribution—a section particularly instructive in all details of technique—contains an account of his various observations on the development of malaria parasites in infected Anopheles and of his experiments to determine certain conditions that influence development. This section is very fully and clearly explained by figures.

Major Greig Anderson contributes some valuable observations on the treatment of malaria, particularly treatment designed to prevent relapses in benign tertian. The standard of a relapse, in these observations, is defined as a rise of temperature to at least 100° Fahr. together with the detection of parasites in a blood film. The standard for measuring the results of a given line of preventive treatment was afforded by 44 cases specifically treated only during the continuance of any actual relapse that might occur during the term of observation, but otherwise only receiving a simple iron tonic mixture.

Underneath the working of all the methods of treatment tested there was observed in benign tertian infections a natural bias to remain quiet during the off season, and to revive—quite apart from any probability of re-infection—during the malaria season. Major Anderson, therefore, emphasizes the proviso that the effects of different lines of treatment are comparable only for cases of the same type treated at the same place and at the same season of the year. Within this proviso it appears from the table of results (see this *Bulletin*, Vol. 19, p. 295) that there was not a great deal to choose between the different methods of treatment tested.

A section, mainly on the investigation of the blood in malaria, is contributed by Captain Kenneth McLay. Its conclusions, though not altogether novel, are well worth quoting, as follows:

"The principal aim in the haematological work of the Malaria Inquiry Laboratory in Salonika was to obtain evidence of the efficacy of the various modes of administering quinine in malaria. The results attained are in favour of the administration of the drug by the mouth as opposed to the intramuscular route in the treatment of the ordinary case of malaria, that is, the case where quinine is tolerated by the alimentary canal. Some evidence has been obtained that the malarial parasite disappears more rapidly from the blood by oral than by intramuscular administration of quinine. The subcutaneous method gives similar results to the intramuscular.

"The great objection to the intramuscular injection is the intense reaction, sometimes amounting to abscess formation, and discomfort which it produces in the patient. These are not justified unless some compensation is afforded in the way of more effective destruction of the parasite, of which there is no evidence. This method should be reserved entirely for cases where the oral route is impossible.

"Four-hourly observations upon the asexual benign tertian cycle appear to show that quinine has an immediate effect upon the malarial parasite, not only upon the young sporulating merozoite but also upon the intracorpuscular stage.

"Sporulation of the parasite in a single infection of benign tertian malaria seems not to be limited merely to the actual time of rigor but to be spread over a period of a few hours, with a wave-like rise during the rigor. In the case of a double benign tertian infection the sporulation seems to be continued throughout the whole cycle, with the same wave-like increase at the time of rigor.

"The cultivation of the malarial parasite *in vitro* is very uncertain and appears to be adversely influenced by the presence of quinine in the body.

"The large mononuclear leucocytes seem to be greatly attracted by the malarial parasite, in whose destruction they probably play an important part.

"The leucocyte count is of undoubted value in the diagnosis of malaria, but a careful, and if necessary, prolonged search for parasites must not be neglected.

"No evidence has been obtained that there is any increased fragility of the red blood corpuscles in malaria.

"Investigations carried out amongst Macedonian school children point to an extreme endemicity of malaria in the native population and a peculiar prevalence of the quartan type of the disease not found amongst the British troops."

Captain T. S. Hele provides a valuable contribution on the urinary excretion of quinine, in which he describes and criticises laboratory methods, and follows the excretion of quinine in a healthy individual, in cases of malaria after a single dose of quinine, and in cases under courses of quinine. The following is a summary of his investigations :—

"(1) The picric acid method for estimating quinine is sufficiently accurate for a clinical laboratory. It can be used with advantage when the apparatus is limited.

"(2) In health quinine is eliminated more rapidly after oral than after intramuscular administration (one case).

"(3) The excretion rate of quinine in health shows no great fall from the second to the twelfth hour after an oral dose, from the fourth to the eighteenth hour after an intramuscular dose, and from the second to the twelfth hour after an intravenous dose. It is suggested that the quinine concentration in the blood is relatively constant over the same periods (one case). The excretion rate of quinine falls off rapidly after the first day. Elimination may continue for ninety-six hours.

"(4) The excretion rate of quinine in malaria is similar to that in health, but there is greater variation, as would be expected, after oral administration.

"(5) In cases of malaria the excretion of quinine shows individual variations, but in the series quoted there is no constant difference observed under different forms of therapy. The amount recovered from the urine varied from ten to thirty per cent. of the administered dose.

"(6) There is no evidence of any decrease of quinine elimination during a course of treatment.

"(7) The excretion of quinine in five cases of blackwater fever was only a little less than normal. In a sixth case the excretion of quinine was less than half the normal. All these cases were passing a fair volume of urine and recovered.

"In a seventh case where there was suppression of urine for three days only traces of quinine were found in the urine removed from the bladder post mortem. There were forty milligrammes of quinine in the liver of this case.

"(8) The faeces of all cases given in this report were examined for quinine. Only traces were detected."

In an after note Captain Hele draws attention to a blue pigment frequently encountered in the urine of patients taking quinine, with the object of enlisting the attention of other workers to its nature and significance.

The final contribution, by Captain J. Waterston, contains an account of the mosquitoes collected in Macedonia. These included 26 species and two varieties. Among them, besides *Anopheles maculipennis* and *A. superpictus*, stigmatized by Wenyon as the principal malaria carriers, were *A. bifurcatus, A. algeriensis, A. plumbeus, A. "hyrcanus"* (better known as *A. sinensis*), and *Stegomyia fasciata*.

In conclusion it must be mentioned that the abstracts already published in this Bulletin (see above, and particularly Vol. 18, pp. 326–327, and Vol. 19, pp. 277–278) include much interesting detail that it has not been thought necessary to notice in a review of general lessons and conclusions.

A. Alcock.

Schilling (Victor). **Das Blutbild und seine klinische Verwertung (mit Einschluss der Tropenkrankheiten). Kurzgefasste technische, theoretische und praktische Anleitung zur mikroskopischen Blutuntersuchung.**—pp. viii + 171. With 3 lithograph plates, 28 text figs. & 190 haemograms.* 1922. Jena: Verlag von Gustav Fischer. [Price 170 mks.]

It is eight years since we had the opportunity of reviewing Schilling's contribution to haematology in his "Ausgewandte Blutlehre für die Tropenkrankheiten" (see this *Bulletin*, Vol. 3, pp. 567–570), written specially from the point of view of tropical disease.

The work now before us fulfils a more ambitious purpose, for it describes the application of the haematology to the practice of medicine, setting forth the manner in which the microscopic study of the blood can aid diagnosis and direct treatment. Schilling argues that scientific haematology should not be regarded as a special cult, but as part of the *armamentarium* of the doctor, and as of equal value with auscultation, percussion, and urinalysis. The subject naturally divides itself into several portions. The first concerns itself with physiochemical problems the agglomeration of the corpuscles, clotting of the blood, and so forth. Then follows a description of the technique of staining methods, etc.; special attention being paid to the preparation of thick blood films and the dark-ground illumination as of particular value in the diagnosis of trypanosome and spirochaetal infections. The practical estimation of the various blood elements in all aspects of the subject receives careful consideration; even the recently-described "haemoclastic crisis" of Widal is included, though considered as of doubtful value.

The author's differential table for leucocyte counts is figured and described; this idea is an extremely practical one, and we gather that leaflets, on which the various types of leucocytes are illustrated, are on sale in Germany, being much in demand in that country. As regards the estimation of haemoglobin, Schilling concentrates on Sahli's haemometer, and has little praise for rough-and-ready methods, such as the Tallquist scale.

The second portion—an exposition of the theory, morphology, and classification of the blood-picture—is minutely elaborated. With regard to the exact value to be attached to leucocytosis, we are pleased to note that a word of warning is sounded, to regard only definite deviations from the normal as of any positive value, but due consideration, from an academic point of view, has to be given to variations due to muscular contractions, digestion, and even posture (Ellermann).

* The term haemogram is applied in this work to features of the blood-picture which are of definite clinical value.

Attention is directed to the practical application of the "Arneth count," to which Schilling attaches an import not generally recognized in the country. It is well known that in septic and toxic infections the immature forms of polymorphs are present in numbers in the blood-stream; the nuclear transitions which these leucocytes undergo, according to degree of maturity, is set forth in an elaborate table, in which the more complex segmented nuclei are ranged on the right-hand side, while the less complex, "sausage-shaped" nucleated forms are on the left. Not less than 80 polymorph cells should be counted and classified in this wise, in order to obtain information of real value. Deviation of the index "to the right" takes place in chronic diseases, such as scurvy, beriberi, sprue, pernicious anaemia, etc. Deviation of the index "to the left" can be subdivided into a "regenerative" and a "degenerative" picture; by these terms we are given to understand that in the first type the predominant polymorph is one with embryonic nucleus, and that in extreme cases promyelocytes and myelocytes may also be present.

As an instance of the practical application of the Arneth picture to surgery, a case is quoted (p. 81) in which a patient, after successful operation for appendicitis, suffered subsequently from an obscure pyrexia. The wound had healed, and the general condition of the patient warranted a favourable prognosis, but persistence of leucocytosis (11,000 : neutrophilia 69 per cent.) indicated further abscess formation. Acting upon this information, the surgeon discovered a small collection of pus buried in the wound. After successful evacuation, it was found that the persistent deviation of the Arneth index to the left and the entry of myelocytes into the blood-stream suggested further extension of sepsis and consequently a very grave prognosis. Death took place shortly afterwards from general peritonitis. The shifting of the index to the left is also illustrated in the case of hepatic abscess with a fatal termination.

Degenerative "stabkerniger," that is to say, neutrophiles with a lobed nucleus which has lost the definite segmentations of the fully-developed polymorph, occur in fevers, such as typhus, pappataci, kala azar, and sometimes tuberculosis. In this condition, unless there is relative lymphocytosis, a general reduction of leucocytes, or a leucopenia, is the rule. The opinion is expressed that probably one estimation of the Arneth index is of little value, but that the plotting out of a curve from daily observation will probably come to be regarded as of definite symptomatic and prognostic value. In order to compute and compare the leucocyte-counts, tables, designated "haemograms," should be compiled with separate columns for the total leucocytosis, basophiles, eosinophiles, myelocytes, young "stabkerniger" and highly segmented polymorphs, lymphocytes, and monocytes (mononuclears). Considerable value is attached to the diagnostics of a lymphocytosis; apart from a physiological rise in the cells, a *pathological* rise occurs in mumps, pertussis, and after administration of adrenalin. The rise in the mononuclear leucocyte (monocytosis) is very briefly considered. The author concludes that this type of cell is most abundantly produced in infections of moderate virulence, but with a tendency to periodic exacerbations, such as protozoal infections (malaria, kala azar, trypanosomiasis), and malignant endocarditis, etc. The question of its exact diagnostic or prognostic value in malaria is not elaborated.

The types of leukaemia and study of the blood-picture in childhood receive consideration.

The third portion of the volume is devoted to the clinical application of the subject-matter already described, and appears to the reviewer merely a needless elaboration and rather tiresome reiteration of technicalities. The demonstration and morphology of blood parasites is very briefly described in 10 pages! The three coloured plates which illustrate this work reach the high standard we have been led to expect from Schilling's former publications, and we may note that they are the work of the same artist.

In conclusion, we are confident that this work fulfils a distinct and useful purpose, appealing especially to the practitioner in the tropics who is constantly dealing with abnormalities of the blood. Whether the finer variations in the blood-picture, or the more minute changes in the leucocytes, are of such definite practical importance as the author of this work would indicate is an open question. At any rate, the "personal equation" enters so much into a computation of this nature that all aspects of a clinical case should be regarded in due perspective, without attaching too much importance to variations in the curves of purely artificial indices.

P. H. Manson-Bahr.

STITT (E. R.). [A.B., Ph.G., M.D., Sc.D., LL.D.] **The Diagnostics and Treatment of Tropical Diseases.** Fourth Edition, Revised. With 159 Illustrations. 1922. London: H. K. Lewis & Co., Ltd. [Price 18*s.* net.]

Surgeon-General Stitt is well known to all students of tropical medicine as the author of two books which have established themselves definitely in public favour. The volume under review, which now appears in the fourth edition, has been considerably revised and expanded. All the various conditions included under tropical diseases are dealt with, and the information given is accurate and up-to-date. Where so much is compressed into such a relatively small space, it is inevitable that the book should be written somewhat in the abbreviated style of a note-book; but the note-book is a very good one, and no points of any importance are left untouched. Indeed, the chief characteristics of the work are conciseness, accuracy and modernity.

The section on the treatment of malaria is excellent, but those on the treatment of some of the other diseases (notably cholera) are rather inadequate.

Although seven pages are given to the etiology of beriberi, which contain a great deal of information, it is doubtful whether anyone, reading the subject here for the first time would be able to form any clear idea of the probable causes of the disease; the views of many authors are given but little or no attempt is made to discriminate between them. Chapter VI. contains an account of WEIL's disease (infectious jaundice), but it is impossible to deal adequately with this subject in the very small space that has been allotted to it. A new chapter has been added on rat-bite fever, and another on tularaemia. The latter contains a very readable description of this newly-recognized disease.

Part II., on the "Diagnostics of Tropical Diseases," can be unreservedly commended. It contains an excellent, short account of the cosmopolitan diseases and the modifications which are seen in the tropics, with brief paragraphs on disturbances of the endocrine secretions, and on focal sources of systemic infection.

Another instructive chapter deals with the importance of due consideration of the mode of onset of the disease, and of the temperature chart, in diagnosis. The author rightly lays stress on the difficulties which attend the use of the clinical thermometer in conditions of high atmospheric temperature; and points out the precautions that should be taken to ensure accurate records. Much information is given on blood-examination; on the examination of the circulatory, respiratory and lymphatic systems; on jaundice, the faeces, the joints, the bones, the skin; and on diseases of the nervous system.

The illustrations, on the whole, are good, but they are of somewhat unequal merit. It would be a decided improvement if the scale of magnification were given in all (as it is in some) of the figures of insects, worms and protozoa.

Considering the limitations of space imposed by the small size of the book, the reviewer considers that too much has been attempted. This book is certainly not one for a novice in tropical diseases; the matter is so concentrated that a reader to whom the subject was new would be liable to suffer from intellectual indigestion. But practitioners in the tropics, advanced students, and those preparing for examinations, will find it very useful as a thoroughly reliable guide for the purpose of a rapid revision of their knowledge.

H. J. Walton.

Vaccarezza (Raul F.), Inda (Francisco F.) & Posse (Rafael). **Tratamiento del carbunclo humano.** [Treatment of Anthrax in Man.] —Reprinted from *La Semana Médica.* 1922. Nos. 22, 23, 24, 25 & 26. 359 pp. With 121 text figs. & 7 tables. 1922. Buenos Aires: Imp. de Obras de E. Spinelli, 2254—Córdoba. [Price not stated.]

An account of 204 cases of anthrax in man treated in various ways, 198 being cases of "malignant pustule" and the rest "malignant (anthrax) oedema." In 167 the bacillus was obtained direct from the serum of the pustule, and in 171 by culture from the fluid.

The following methods of treatment were adopted in different series of cases:—

1. With *normal bovine serum* in doses of 30–50 cc. once or twice a day in cases of average severity. Fifteen were so treated, and the conclusion was reached that the previous favourable reports were too sanguine, though the preparation was certainly as useful in this disease as was specific serum. Experimental work with animals had also led the authors to conclude that neither for prophylaxis nor in treatment is normal serum as efficacious as that of animals immunized with the bacilli.

2. With *Pyocyanase* and *Pyocyanin*. The former of these is the name given to cultures of some three weeks old, reduced to one-tenth by evaporation *in vacuo*, treated with ten times the weight of alcohol and filtered; Pyocyanin is the filtered products of cultures of *B. pyocyaneus* heated to 70° C. for an hour. Ten to twenty cc. were injected subcutaneously in the neighbourhood of the lesion, and, if necessary, repeated in a few days. This method was not tried in a sufficient number of patients for reliable conclusions to be drawn, but the impression obtained was that the results were not so good as with specific serum.

3. Injection of *Peptone* (generally 5 per cent.) intramuscularly in dose of 30 cc. daily, or, in some instances, twice in the 24 hours. Forty-three patients were thus treated, and full details are given of each case. Four terminated fatally. The results obtained were as good as those with normal or specific serum.

4. *Antiserum of Mendez.* Average dose 15–20 cc. intravenously. Of the 56 treated 11 died.

5. Specific *D.N. de H. serum* (Departamento Nacional de Higiene). Twenty-four cases with two deaths.

6. Eleven patients received symptomatic treatment only. One of these died practically at the moment of entrance to hospital, and another from tetanus within a few hours. The remainder recovered.

A combination of forms of treatment was employed in 32 cases.

The final conclusion of the writers of this record is that peptone gives as good results as any of the sera employed, and that specific is very little superior to normal serum.

H. Harold Scott.

Austen (E. E.) & Hegh (Emile), with a Preface by the Earl Buxton. **Tsetse-Flies. Their Characteristics, Distribution, and Bionomics, with Some Account of Possible Methods for their Control.**—188 pp. With 5 plates & 19 text figs. 1922. London: Imperial Bureau of Entomology, 41, Queen's Gate, S.W.7. [Price 7*s.* 6*d.* net.]

This encyclopaedic dissertation appears to contain all that is known about tsetse-flies, the first chapter showing by clear figures and explanations how they can be distinguished from all other flies, and the last leading to the points whence further study of their bionomy should be continued. Between the initiation and the goal of graduation as an independent observer, the neophyte is taken through seventeen stages, in which the following particulars are fully expounded:—

The distinctive characters and the geographical distribution of the several species. The facts and circumstances of reproduction, gestation, and post-embryonic development, and the places and season of breeding. The peculiarities of habitat of the several species. Their bionomy. The nature of their food and the manner and times of their feeding. Their preferences as predatory parasites, and their relations to small animals of various classes, to big game, and to trypanosomiasis. Circumstances in their physical environment by which they are influenced. Their competitors and predatory enemies and their parasites. The different measures by which they may be destroyed, incommoded and circumvented with a view to their control and subjection by man. Instructions for collecting and preserving them, for breeding and keeping them alive for experimentation, for dissection, for graphically recording their distribution, and for studying them and their habits. Then there is a most valuable bibliography containing more than 170 references to original observations. There are also, besides 19 figures in the text, three exquisite plates of the commoner species, and two plates of typical breeding-places.

The entire collection of solid fact is presented clearly and with fastidious accuracy. On page 96, however, the statement that trypanosomes have not been recorded as occurring in the blood of the elephant and the hippopotamus requires reconsideration.*

A. Alcock.

Waterston (James). **The Louse as a Menace to Man: Its Life-History and Methods for its Destruction.**—*British Museum (Natural History) Economic Series No. 2.* 20 pp. With 1 plate & 2 text figs. 1921. London: Printed by Order of the Trustees of the British Museum. [Price 6*d.* net.]

This pamphlet is intended to replace "The Louse in its Relation to Disease" by the late Mr. Bruce Cummings, which is now out of print. It consists of three sections, the first of which deals with the life-history and habits of the crab-louse and head and body lice, the second with lice in relation to disease, and the third with methods for destroying lice. It is well and clearly written, and contains in a concise form all the information required by a medical officer.

The only questionable particular in its admirable survey is the adoption of the view that overlooks, on the one hand, the affinities between bugs and lice, and, on the other hand, those—so well illustrated by the parasitic

* *Sleeping Sickness Bulletin*, No. 11, p. 436; No. 26, p. 173. The paper by Bruce and colleagues on a trypanosome of the African elephant was reprinted in the *Sleeping Sickness Reports of the Royal Society*, in which the authors have overlooked another reference of historical interest (Rep. No. 9 (1908), pp. 45–48), also cited in the *Sleep. Sick. Bull.* (No. 3, p. 117.) under Hodges. Here, indeed, are several references, appended to an article summarizing the knowledge of *Glossina palpalis* at that date (1909), which are not found in the present book.—[Ed.]

Hemimerus—between Mallophaga and Orthoptera, and fixes on the Mallophaga as the most intimate relatives of the blood-sucking lice. The matter, of course, is not of much importance in a treatise having a purely economic intention.

A. Alcock.

Laing (Frederick). **The Cockroach : Its Life-History and how to deal with it.**—*British Museum (Natural History) Economic Series No. 12.* 18 pp. With 1 plate & 2 figs. 1921. London : Printed by Order of the Trustees of the British Museum. [Price 6*d.*]

Cockroaches are insects that arouse the justifiable suspicion of the sanitarian, who will be glad of this budget of useful information about their habits and about the approved methods of destroying them. Three species have become affiliated to man, namely, *Blatta orientalis*, commonly known as " black beetle," *Periplaneta americana*, the large reddish cockroach, and *Blatella germanica*, the little misnamed " german " cockroach. There is a fourth domestic species, *Periplaneta australasiae*, the Australian cockroach, distinguished by the presence of a yellow ring within the margin of the first thoracic segment and a yellow dash on the sides of the wing-covers, which is not nearly so intimate with man as the other three.

The author informs us that in this country—where, however, growth is probably retarded by the unkind British climate—*Blatta orientalis* takes about five years to attain the dignity of an adult. *Blatella germanica*, however, reaches sexual maturity in considerably less than a year, and *Periplaneta americana* is stated to become full-grown in America within a year.

The particular poison recommended by the author is a mixture of three parts of sodium fluoride and one part of pyrethrum powder; but sweetened borax powder, and a mixture of one part of plaster of Paris and two parts of sugar are also known to be efficacious. The powders are scattered about the insects' haunts at night. Properly baited traps are also very useful. [The reviewer has permanently exterminated cockroaches from a badly-infested house by the continuous use, through one summer, of a " Demon " trap.] Where cockroaches are so numerous as to necessitate the employment of fumigation with sulphur, the author's recommendation is that 2 lb. of sulphur per 1,000 cu. ft. is necessary. The author also mentions carbon bisulphide [but it is a dangerous thing to use]. In premises where steam-pipes are fitted a sustained temperature of 130° F. is fatal to cockroaches.

A. Alcock.

British Museum (Natural History). **A Guide to the Domesticated Animals (other than Horses) exhibited in the Central and North Halls of the British Museum (Natural History), Cromwell Road, London, S.W.** Third Edition. 56 pp. With 25 figs. 1918. London : Printed by Order of the Trustees of the British Museum. [Price 1*s.*]

The book in its present form is merely a new impression, with one or two unimportant corrections, of the second edition published in 1912, which was revised and brought up to date by the original author, Lydekker. It is a commentary on the exhibits (other than horses), which include various breeds of cattle, buffaloes, sheep, goats, pigs, dogs, and cats, as well as the llama and alpaca, ferrets, guinea-pigs, rabbits, rats and mice, pigeons, poultry, ducks and geese, and canaries.

The interest of the exhibits, which illustrate the wonderful plasticity of organisms and the remarkable modifications that can be established under domestication, and the interest of this well-illustrated guide-book, are perhaps even more manifest to the medical profession than they are to the educated public.

A. Alcock.

ROCKEFELLER FOUNDATION. **International Health Board. Eighth Annual Report, January 1, 1921-December 31, 1921.** [ROSE (Wickliffe), General Director.]—pp. xvii + 168. With 62 text figs. 1922. New York: 61, Broadway, U.S.A.

Of the contents of this interesting report those that have a particular reference to diseases most prevalent under tropical conditions will command our attention. Of these ankylostomiasis may be taken first, if only for the reason that, individually, it is the bulkiest ingredient of the report and its appendix.

As regards hookworm, then, we learn that the Board, having extensively demonstrated that this disease can be controlled, and shown how that control can be acquired and maintained, is inclined, so far as countries near home are concerned, to leave its well-bought experience as a lesson for general application in this and other directions by local authorities. In far-off countries, however—Mauritius, Ceylon, Madras, Siam, Borneo, and several parts of the Australian region—fresh surveys and propaganda have been started.

Against yellow fever the fields of action have been Peru, Mexico, and British Honduras, and the object of attack has been the Stegomyia larva, though vaccination with killed cultures of the *Leptospira icteroides* has been practised also in all three areas. In the local circumstances the most efficient method of dealing with the Stegomyia larva is stocking all domestic water-vessels with small fish; these were distributed at the rate of 2–4 for vessels of 10–15 gallons capacity. The efficacy of the Noguchi vaccine was strikingly illustrated in two local epidemics, in each of which 200 vaccinated persons entirely escaped attack. Attention is directed to two instructive maps, comparing the hold of yellow fever on the Western Tropics in 1900 and in 1921.

It may be remembered that in 1920 the Board sent a yellow fever commission to West Africa, which, though it did not detect any existent case, found strong evidence of active infection in recent years.

Operations for control of malaria have been extended in the southern States and also to Nicaragua. In small towns and farmsteads the top-minnow has demonstrated its efficacy against Anopheles. Control by quinine treatment of human carriers has also been tested with favourable results.

The Appendix, compiled from special articles already published or in manuscript, contains much valuable information on the incidence of hookworm in Madras and in the Australian region; on the extra-corporeal life of the hookworm; on the relation of fowls and pigs to the spread of the worm; on the effects of salt-water on its eggs; and on methods of diagnosis of infection; and an interesting diagram illustrates how hookworm tends to become gradually reduced if risk of reinfection is limited. It also contains details of various antimosquito measures, including the employment of fish in reducing Anopheles larvae.

Frequent recurrence of a confident militant note in this report reminds us once more of the formidable austerity of the resolute sanitarian.

A. Alcock.

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Am. signifies Amoebiasis and Amoebic Dysentery.
Bb. ,, Beriberi
Bl. ,, Blackwater
B.R. ,, Book Review
Chl. ,, Cholera
Der. ,, Tropical Dermatology
Dys. ,, Dysentery (Bacillary and Unclassed)
Ent. ,, Enteric Fevers
Fev. ,, Fevers
Hel. ,, Helminthiasis
H.S. ,, Heat Stroke
Jaun. ,, Infectious Jaundice
K.A. ,, Kala Azar
Lab. ,, Laboratory Methods
Lep. signifies Leprosy
Mal. ,, Malaria
Misc. ,, Miscellaneous
Oph. ,, Tropical Ophthalmology
Pel. ,, Pellagra
Pl. ,, Plague
R.F. ,, Relapsing Fever
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Epstein, H., 775 (Lab.)

Escomel, E., 159 (Der.)
Eugling, M., 571 (Mal.)
Evans, A. M., 475, 828 (Z.)
——, with Newstead, 117, 490 (Z.)
Evans, H. M., 122 (Z.)
Eyre, J. W. H., & Marshall, C. H., 141 (S.S.)
Ezickson, W. J., 842 (Z.)

F

Fairley, K. D., 670 (Hel.)
Fairley, N. H., 199, 646, 671 (Hel.)
——, & Dew, H. R., 288 (Mal.)
——, with ——, 47 (Dys.)
Falleroni, D., 279 (Mal.)
Falzi, O., 682 (Am.)
Farah, N., 431 (Misc.)
de Faria, J. A., 727 (Pl.)
Fauré, 232 (Hel.)
Faust, E. C., 467 (Z.)
——, & Wassell, C. M., 458 (Z.)
Favre, M., with Nicolas, 799 (Misc.)
Federated Malay States, 111 (Z.)
Ferguson, E. W., 278 (Mal.), 726 (Pl.)
Ferris, 330 (Am.)
Ferris, G. F., & Cole, F. R., 837 (Z.)
Ferro, P., 582 (Mal.), 678 (Am.)
Ferry, G., with Beckerich, 560 (R.F.)
Fiessinger, N., & Blum, G., 746 (Und.)
Fifth Congress of the Far Eastern Association of Tropical Medicine, Singapore, 763.
Fignolini, F., 33 (Am.)
Filho, M., 406 (Tb.)
Filippini, A., (376) (Pl.)
Finochietto, E., & Vaccarezza, R. F., 28 (Am.)
Fischer, W., 25, 331 (Am.), 194 (Hel.)
——, & von Hecker, 788 (Sp.)
Fiske, W. F., 488 (Z.)
Fitz-Gerald, W. E., 37 (Dys.)
Flamerich, C., (300) (Mal.)
Fleck, H. K., 62 (Oph.)
Fleischner, E. C., with Meyer & Shaw, 749 (Und.)
——, Vecki, M., Shaw, E. B., & Meyer, K. F., 350 (Und.)
Fletcher, T. B., 845 (Z.)
——, & Senior-White, R., 888 (S.S.)
Fletcher, W., 385 (Ent.)
——, with Stanton, 617 (Misc.)
Flu, P. C., 225, 653 (Hel.)
Foley, H., & Parrot, L., 166 (Der.)
——, with Sergent, Edm., 321 (R.F.)
——, with ——, & Et., 148 (S.S.)
——, with ——, & Parrot, 478 (Z.)
Fontoynont, M., & Salvat, P., 597 (Der.)
Foot, N. C., 599 (Der.), 843 (Z.)
Forgues, 732 (Pl.)
——, with Thoulon, 734 (Pl.)
de Fossey, M., with Le Noir, 688 (Am.)
Fox, E. C. R., 168 (Der.)
——, & Mackie, F. P., 310 (K.A.)
Fraenkel, E., with Brauer, 293 (Mal.)
França, C., 466, 484 (Z.), 522 (Misc.), 648 (Hel.), 826 (Z.)
——, & Parrot, L., 484 (Z.)
Franchini, F., 677 (Am.)
Franchini, G., 464, 465, 466, 467, 469 (Z.), 519, 520, 887 (S.S.), 825, 826 (Z.)
——, with Roubaud, 821 (Z.)
Francis, E., 442, 444 (Misc.)
——, & Lake, G. C., 442 (Misc.)
——, & Mayne, B., 442 (Misc.)
Francke, 666 (Hel.)
Franco, E. E., 309, 549, 554 (K.A.)
Franke, F., 667 (Hel.)
Freeborn, S. B., 482 (Z.)
Freund, R., with Rosenthal, 888 (S.S.)
Friedemann, U., 861 (Mal.)
v. Friedrich, L., 336 (Dys.)
Frouin, A., & Guillaumie, M., 514 (S.S.)
Fry, A. B., 578 (Mal.)
Fry, A. S., 681 (Am.)
Fukuhara, Y., 43 (Dys.)
Fülleborn, F. 197, 234, 235, (672) (Hel.), 768 (Lab.)
Funk, C., & Dubin, H. E., (416) (Bb.)
Furuichi, T., 328 (Am.)

G

Gabrielides, A., & Guiart, J., 487, 840 (Z.)
Galbraith, J. B. D., 425 (Pel.)
Gale, A. M., 434 (Misc.)
Galli-Valerio, B., 107, 114, (499) (Z.)
Gambier, A., with Marzin, 168 (Der.)
Ganguly, L., 547 (K.A.)
Ganguly, S. K., (715) (Oph.)
Garavaglia, A., (741, Chl.)
Garcia Martinez, A., 702 (Dys.)
Gardner, A. D., 340 (Dys.)
Garnier, 371 (Pl.), 377 (Chl.)
Garraham, J. P., with Acuna, 416 (Bb.)
Gärtner, W., 752 (Fev.)
Gastou, P., 554 (K.A.)
Gauducheau, A., 689 (Am.)
Gedoelst, L., 488 (Z.)
Gei, K., with Kojima, 195 (Hel.)
Genevrier, 583 (Mal.)
de Gennes, L., with Joltrain, 376 (Pl.)
Genovese, F., 588 (Mal.)
Gérard, F., with Conseil, 866 (Mal.)
Gerbasi, E., 747 (Und.)
Gerstmann, J., 580 (Mal.)
Ghosh, N., 603 (Der.)
Gianfranco, C., 390 (Mal.)
Gibbon, E., with Chalmers, 174 (Der.)

Giblin, W. E., 170 (Der.)
Giemsa & Halberkann, with Mayer & Zeiss, 879 (S.S.)
Gildemeister, E., 381 (Chl.)
Gill, C. A., 555 (R.F.)
Gioseffi, M., 284, 578 (Mal.)
Girard, 200 (Hel.)
de Gironcoli, F., (672) (Hel.)
Givens, M. H., McClugage, H. B., & van Horne, E. G., 419 (Sc.)
Glaser, F., 299 (Mal.)
Gläser, H., 659 (Hel.)
Glaser, R. W., 821 (Z.), 886 (S.S.)
Gobert, E., 369 (Pl.)
——, with Nicolle, 204 (Hel.)
Godillon, 863 (Mal.)
Godoy, A., & Pinto, C., 856 (Mal.)
Goêré, R., 341 (Dys.)
van Goidsenhoven, C., with Broden, 149 (S.S.)
Goldberger, J., & Tanner, W. F., 423 (Pl.)
Goldsmid, J. A., 789 (Sp.)
Gomes, J. F., 120 (Z.)
Gomes, J. M., 161, 162 (Der.)
Gonçalves, N. B., 167 (Der.)
González, E., with Iturbe, 324 (R.F.), 602 (Der.)
Goodey, T., 245 (Hel.)
Goodman, H., with Parounagian, 602 (Der.)
Gordon, R. M., 662 (Hel.)
——, & Young, C. J., 111 (Z.)
Goré, S. N., 82 (Misc.)
——, with Malone, 81 (Misc.)
von Gottberg, J., 197 (Hel.)
Gougerot & Ruppe, 394 (Lep.)
Gouillon, P., with Montpellier, 164 (Der.)
——, with Sergent, Et., 227 (Hel.)
Gouzien, P., 370 (Pl.)
Goyon, A., & Debray, J., 694 (Dys.)
de Goyon, J., 370, 734 (Pl.)
de Goyon & Le Vilain, 168 (Der.)
Graham, E. N., (672) (Hel.)
Graham, G., 49 (Dys.)
Graham, J. D., 243 (Hel.)
Graham, S. G., 43 (Dys.)
Granjux, 577 (Mal.)
Grant, G. B., & Wilson, E. R., 88 (Misc.)
Grant, M., with Wallace, 668 (Hel.)
Grantham-Hill, C., with Atkey, 872 (Mal.)
Grassi, B., 479, 481 (Z.), 857 (Mal.)
Graziadei, G., & Mario, S., 706 (Dys.)
Green, A. S., & Pacheco, L. R., 63 (Oph.)
Greenbaum, S. S., with Klauder, 171 (Der.)
——, & Schamberg, J. F., 593 (Lep.)
Greig, D. M., 838 (Z.)
Grill, V., 655 (Hel.)
Gros, H., 582 (Mal.)
Guiart, J., with Gabrielides, 487, 840 (Z.)
Guillaumie, M., with Frouin, 514 (S.S.)
Guimarães, A., (707) (Dys.)
Guimãraes, U. P., with Colares, 431 (Misc.)
Guinon, L., & de Pfeffel, (376) (Pl.)
Gujo, K., & Chuma, M., 593 (Lep.)
Gulbransen, R., with Browning, 882 (S.S.)
Gunn, H., 819 (Z.)
Gupta, B. M. D., 548 (K.A.), 559 (R.F.)
Gupta, H. D., 58 (Oph.), 227 (Hel.)
Gupta, J. M. S., 169 (Der.)
v. Gutfeld, F., 785 (Lab.)
Guthrie, J. B., 581 (Mal.)

H

Hacker, H. P., 111 (Z.)
Hackett, 242 (Hel.)
Hage, 676 (Am.)
Hagiwara, H., with Hashimoto, 844 (Z.)
Hakansson, E. G., 238 (Hel.)
Halberkann & Giemsa, with Mayer & Zeiss, 879 (S.S.)
Halbreich, J., with Oettinger, 557 (R.F.)
Hall, J. S., with Dutcher & Harshaw, 420 (Sc.)
Hall, M. C., 200 (Hel.)
Haner, R. C., with Kendall, 339 (Dys.)
——, with ——, & Bly, 339 (Dys.)
Hannibal, E. A., & Boyd, M. F., 52 (Sp.)
Hansen, I., 678 (Am.)
Hanson, H., 286 (Mal.)
Hara, M., with Ohomori, Ohhashi, Nakanichi, & Ota, 759 (Bb.)
Harada, S., with Nomura & Sotoma, 377 (Chl.)
Harford, C. F., 60 (Oph.)
Harkness, A. H., 647 (Hel.)
Harman, N. B., (715) (Oph.)
Harold, C. H. H., 556 (R. F.)
Harper, P., 395 (Lep.)
Harrison, P. W., 647 (Hel.)
Harsant, A. G., 211 (Hel.), (349) (Bl.)
Harshaw, H. M., with Dutcher & Hall, 420 (Sc.)
Hartman, H., & Bowie, A., 375 (Pl.)
Hartwell, J. B., 819 (Z.)
Harvey, W. F., 83, 84, 86, 87 (Misc.), 771, 781 (Lab.)
——, & Iyengar, K. R. K., 80 (Misc.), 779 (Lab.)
——, ——, & Christophers, S. R., 81 (Misc.)
Hashimoto, T., & Hagiwara, H., 844 (Z.)

Hattori, T., with Kawamura & Yamaguchi, 71, 753 (Fev.)
Haughwout, F. G., 105, 106, 498 (Z.), 700 (Dys.)
Hauke, H., with Mathias, 694 (Dys.)
Hausherr, O., 46 (Dys.)
Hausmann, T., 704 (Dys.), 765 (Sc.)
Hawk, P. B., with Smith & Bergeim, 419 (Sc.)
Haworth, W. E., 829 (Z.)
Hayashi, N., 71 (Fev.)
Haydon, L. G., 366 (Pl.)
Hayne, T. B., with Barber, 482 (Z.)
Hazra, M. M., 496 (Z.)
Heck, M. E., 406 (Tb.)
Heckel, F., 614 (Misc.)
von Hecker, with Fischer, 788 (Sp.)
Hegh, E., with Austen, E. E., 898 (B.R.)
Hegner, R. W., 153 (S.S.), 462 (Z.)
Heinemann, H., 88 (Misc.), 299 (Mal.)
Hele, T. S., 585 (Mal.)
——, with Wenyon, Anderson, McLay & Waterston, 889 (B.R.)
Henric & Lamoureux, 568 (Y.F.)
Henry, 390 (Lep.), 799 (Misc.)
Hermel, 40 (Dys.)
Hermitte, L. C. D., (672) (Hel.)
Herms, W. B., 481 (Z.)
Hernault, J., 651 (Hel.)
Herringham, W. P., with Macpherson, Elliott & Balfour [Edited by], 800 (B.R.)
Herzog, F., 421 (Sc.), 669 (Hel.)
Hesnard, A., 862 (Mal.)
Hess, A. F., & Unger, L. J., 421 (Sc.)
Hess, W. R., 414 (Bb.)
Hesser, S., with Kling, 375 (Pl.)
Hewlett, R. T., & Nankivell, A. T., 176 (B.R.)
Hildebrand, S. F., 112, 495 (Z.)
Hill, G. F., 827 (Z.)
Hingston, R. W. G., 528 (Misc.)
Hiraishi, S., with Taguchi & Kwa, 759 (Bb.)
Hirson, B., with Corfield, 659 (Hel.)
Hirst, S., 809 (B.R.)
Hirtzmann, L., 330 (Am.)
Hoare, C. A., 107 (Z.), 874 (S.S.)
Hodgson, E. C., 733 (Pl.)
Hodson, V. S., 196, 212, 670 (Hel.), 297 (Mal.), 330 (Am.)
Hoey, M. J., 435 (Misc.)
Hoffmann, W. H., 440 (Misc.), 495 (Z.), 564, 565, 569 (Y.F.)
Hofmeister, F., 412 (Bb.)
Hogue, M. J., 104 (Z.)
Holland, B. T., 55 (Oph.)
Holland, Malariacommissie, 282, 855 (Mal.)
Hollande, A. C., with Cade, 51 (Dys.)
Hollenbeck, H. S., 612 (Misc.)
Hollmann, H. T., 395 (Lep.)
Home, W. E., 294 (Mal.)
Honda, I., 228 (Hel.)
Hone, F. S., 754 (Fev.)
van Hoof, 605 (Misc.)
——, with van den Branden, 556 (R.F.), 870 (Mal.), 881 (S.S.)
Hooper, C. W., with Johnson, 74 (Bb.)
Höppli, 650 (Hel.)
Hornabrook, R. W., 734 (Pl.)
van Horne, E. G., with Givens & McClugage, 419 (Sc.)
Horne, J. R., 616 (Misc.)
Hornus, P., 867 (Mal.)
Horst, M. D., 73 (Bb.)
Horta P., 160 (Der.)
Houssay, B. A., & Negrete, J., (499) (Z.)
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Howard, H. H., 857 (Mal.)
Howard, R., 167 (Der.)
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Hurst, A. F., 49 (Dys.)
Hutinel, J., with Widal & Abrami, 683 (Am.)
Hylkema, B., 373 (Pl.)
——, with Schüffner, 287, 572 (Mal.)

I

Iitayo, K., 381 (Chl.)
Iltis, H., 832 (Z.)
Inda, F. F., with Vaccarezza & Posse, 897 (B.R.)
Indian Science Congress Handbook, 859 (B.R.)
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Irisawa, 763 (Bb.)
Irvine, L. G., with Watkins-Pitchford & Smith, 401 (Tb.)
Irving, H., with Summons, 212 (Hel.)
Ishiwara, K., & Ogata, N., 754 (Fev.)
Ito, S., with Ando, 668 (Hel.)
Iturbe, J., 470 (Z.)
——, & González, E., 324 (R.F.), 602 (Der.)
Iyengar, K. R. K., 407 (Tb.)
——, with Harvey, 80 (Misc.), 779 (Lab.)
——, with ——, & Christophers, 81 (Misc.)
Iyengar, M. O. T., 483, 833 (Z.)
Izar, G., 685 (Am.)

J

Jackson, H. G., 215 (Hel.)
Jackson, L., 686 (Am.)
Jacoby, F., 43 (Dys.)
Jaffé, R. H., 748 (Und.)
Jagger, T. R., with McWhae, 203 (Hel.)
Jahier, with Benhamou & Berthelemy, 291 (Mal.)
James, S. P., 474 (Z.)
Jamot, 144 (S.S.)
Jancsó, N., 586 (Mal.)
Janowski, W., 39 (Dys.)
Jeanselme, E., Schulmann, E., & Pomaret, M., 225 (Hel.)
Jegat, Y., with Lenoble, 682 (Am.)
Jelks, J. L., 423 (Pel.)
Jemma, G., 314 (K.A.)
Jensen, E. T., (158) (S.S.)
Jepps, M. W., 30 (Am.), 459 (Z.)
de Jesús, V., 394 (Lep.)
Jezierski, W., & Wierzbicki, B., 337 (Dys.)
Jimenez, J., with Legroux, 314 (K.A.)
Jiménez, R. M., (589) (Mal.)
Job, E., 38 (Dys.)
Joff, I., with Kitaeff, 867 (Mal.)
John, J. C., 33 (Am.)
Johns Hopkins Univ., 498 (Z.)
Johnson, J. M., 766 (Sc.)
——, & Hooper, C. W., 74 (Bb.)
Johnson, R. E. I., 579 (Mal.)
Johnson, W. B., 527 (Misc.)
——, with Davies, 67 (Fev.)
Johnston, T. H., 486 (Z.)
Jojot, Ch., 501 (S.S.)
Joltrain, E., & de Gennes, L., 376 (Pl.)
Jona, G., 292 (Mal.)
Jones, D. E., with Lornie, 695 (Dys.)
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Jones, S. B., 649 (Hel.)
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Joseph, F. H., 771 (Lab.)
Josephs, H. W., & Davison, W. C., 337 (Dys.)
Jouenne, 597 (Sk.), 796 (Misc.)
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——, with Nogue, 878 (S.S.)
Joulia, P., with Dubreuilh, 596 (Der.)
Journal of the Department of Agriculture, Pretoria, 837 (Z.)
—— of Parasitology, 200 (Hel.)
—— of Tropical Medicine & Hyg., 529 (Misc.)
Jouveau-Dubreuil, 793 (Misc.), 410 (Bb.)
Julio Muniz, with Da Cunha, 820 (Z.)

K

Kabeshima, T., 738 (Chl.)
Kagoshima, S., 760 (Bb.)
Kamimura, Y., & Tsuda, K., 739 (Chl.)
Kanai, S., 341 (Dys.)
Kaneko, J., 760 (Bb.)
Kaneko, R., 324 (R.F.)
Karwacki, L., & Krakowska, Z., 558 (R.F.)
Kasai, K., 559 (R.F.), 562 (Jaun.)
Kato, G., Shizume, S., & Maki, R., 75, 413 (Bb.)
Katsura, H., with Kumagaya, Oyama & Saito, 762 (Bb.)
Kawai, J., with Watanabe, Y., & Watanabe, H., 384 (Chl.)
Kawakami, Z., 413 (Bb.)
——, & Kitagawa, M., 228 (Hel.)
Kawamura, R., Hattori, T., & Yamaguchi, M., 71, 753 (Fev.)
——, & Yamaguchi, M., 218 (Hel.), 753 (Fev.)
Kawatani, M., with Watanabe, Y., & Watanabe, H., 384 (Chl.)
Kazama, Y., 648 (Hel.)
Kazuo, H., 60 (Oph.)
Keates, H. C., 755 (Fev.)
Keilin, D., 113, 114 (Z.)
Kendall, A. I., & Haner, R. C., 339 (Dys.)
——, ——, & Bly, R. S., 339 (Dys.)
Kennedy, J. C., with Dive, 386 (Ent.)
Kenneth, J. H., 809 (B.R.)
Kenya Colony, 615 (Misc.), 842 (Z.)
Ketron, L. W., 172 (Der.)
Khaled, E., 351 (Und.)
Khalil, M., 120 (Z.), 213, 245, 646, 649 (Hel.)
Kiamil, M., 728 (Pl.)
Kieffer, J. J., 114, 495 (Z.)
Kilker, C. H., with McCord, & Minster, 167 (Der.)
Kilpatrick, G. C., 691 (Am.)
Kimura, O., 219 (Hel.)
Kirkpatrick, H., 60, 713 (Oph.), 91 (B.R.)
Kirschner, L., with Doerr, 298 (Mal.)
Kitaeff, F., & Joff, I., 867 (Mal.)
Kitagawa, M., with Kawakami, 228 (Hel.)
Klauder, J. V., & Greenbaum, S. S., 171 (Der.)
Kligler, I. J., & Robertson, O. H., 323 (R.F.)
Kling, C., & Hesser, S., 375 (Pl.)
Kling, D., 342, 693 (Dys.)
——, with Bernstein & Rosenblatt, 332 (Dys.)
Klippel & Monier-Vinard, 312 (K.A.)
Knight, H. H., 843 (Z.)
Knighton, J. E., 820 (Z.)

Knorr, M., 334 (Dys.)
Knuth, P., & du Toit, P. J., 263 (B.R.)
Kobayashi, C., 121 (Z.)
Kobayashi, H., 115, 834 (Z.), 650, 659 (Hel.)
Kobayashi, S., 217 (Hel.)
Koch, J., 378 (Chl.)
Kodama, H., (741) (Chl.)
Kodama, T., 381, 738 (Chl.)
——, & Takeda, E., 380 (Chl.)
Kofoid, C. A., & Swezy, O., 684 (Am.)
——, Boyers, L. M., & Swezy, O., 685 (Am.)
Kogerer, H., 580 (Mal.)
Kohgi, C., 657 (Hel.)
Koidzumi, M., 465 (Z.)
Kojima, S., & Do-Kin, C., 173 (Der.)
Kojima, T., & Gei, K., 195 (Hel.)
Kolisch, R., 707 (Dys.)
Kolmer, J. A., with Schamberg & Raiziss, 143 (S.S.)
Kolpakoff, F. A., with Yakimoff, 461 (Z.)
Kondô, K., 233, 238, 657 (Hel.)
Kondo, Y., 233 (Hel.)
Konsuloff, S., 112 (Z.)
Kop, W. A., 88 (Misc.), 290 (Mal.)
Kopke, A., 713 (Oph.)
Korniloff, M. T., with Yakimoff, Wassilewsky & Zwietkoff, 467 (Z.)
Korteweg, P. C., 282, 855, (Mal.)
Korthof, G., 697 (Dys.)
Koster, S., 90 (Misc.)
Kostrzewski, J., 37 (Dys.)
Kotlán, A., 820 (Z.)
Krakowska, Z., with Karwacki, 558 (R.F.)
Kramer, P. H., 865 (Mal.), (707) (Dys.)
Kraus, R., 382 (Chl.), 847 (Z.)
Krause, D. J., 762 (Bb.)
Krause, M., 514 (S.S.)
Krediet, G. J., 716 (B.R.)
Kremer, W. (707) (Dys.)
Krueger, M., with Rosenthal, 154 (S.S.)
Kubo, K., 761 (Bb.)
Kudo, R., 107, 108, 470 (Z.)
Kuenen, W. A., 73 (Bb.)
Kuhn, P., 834 (Z.)
Kulp, W. L., with Anderson, 761 (Bb.)
Kumagaya, M. M. K., Oyama, T., Katsura, H., & Saito, D., 762 (Bb.)
Kuntze, G., 37 (Dys.)
Kwa, F., with Taguchi & Hiraishi, 759 (Bb.)

L

Laake, E. W., with Bishopp, 485 (Z.)
——, with Wells & Bishopp, 471 (Z.)
Labbé, M., & Bith, H., 703 (Dys.)
Lacroix, A., with Montpellier, 164 (Der.), 229, 230 (Hel.)
Lacroix, A., with Montpellier & Boutin, 230 (Hel.)
——, with —— & Degouillon, 172 (Der.), 229 (Hel.)
Lade, O., 36 (Dys.)
La Frenais, H. M., with Cornwall, 304 (K.A.), 618 (Misc.)
——, with Patton & Sundara Rao, 304 (K.A.)
Laignel-Lavastine, with Colin & Mourgue, 504 (S.S.)
Laigret, with Ouzilleau & Lefrou, 231 (Hel.)
Laing, F., 899 (B.R.)
Lake, G. C., with Francis, 442 (Misc.)
Lambert, R. A., 609 (Misc.)
Lambert, S. M., 195 (Hel.)
Lamborn, W. A., 113, 475, 831 (Z.)
Lamoureux, with Henric, 568 (Y.F.)
Lane, C., 93 (Mal.)
Lane, C. G., 599 (Der.)
Lanfranchi, A., & Sani, L., 150 (S.S.)
de Langen, C. D., 796 (Misc.)
Langeron, M., 266 (B.R.), 472, 478 (Z.)
Langley, G. J., 329 (Am.)
Langworthy, H. V., with Wadsworth, Stewart, Moore & Coleman, 561 (Jaun.)
Lankester, A., 268 (B.R.)
Lantin, P. T., 696 (Dys.)
Laporte, 591 (Lep.)
Laporte, F., & Roques, E., 682 (Am.)
Larrousse, F., 487 (Z.)
——, with Brumpt, 845 (Z.)
Lasbrey, F. O., & Coleman, R. B., 210 (Hel.)
Laveran, A., 851 (Mal.)
de Lavergne, V., 705 (Dys.)
——, with Besson, 338 (Dys.)
Lavier, G., 467, 470 (Z.)
——, with Brumpt, 881 (S.S.)
Lawrence, H., 172 (Der.), 494, (499) (Z.)
League of Nations, 336 (Dys.)
Le Dantec, 792 (Misc.)
Lefebvre, C., & Baillat, (672) (Hel.)
Lefrou & Ouzilleau, 505 (S.S.)
——, with —— & Laigret, 231 (Hel.)
Legangneux, H., with Loir, 843 (Z.)
Legendre, J., 480 (Z.)
——, & Oliveau, A., 111 (Z.)
Leger, A., 851 (Mal.)
——, A. & M., 107 (Z.)
Leger, M., 196, 222, 247 (Hel.), 587 (Mal.)
——, & Baury, A., 367, 732, 733 (Pl.), 852 (Mal.), 887 (S.S.)
——, & Pringault, E., 201 (Hel.)
Legg, J., & Rheuben, J. A., 258 (Hel.)
Legroux, R., & Jimenez, J., 314 (K.A.)
Leiper, R. T., 361 (Hel.)
Leipoldt, C. L., Cleaver, A. F., & Elias, P., 284 (Mal.)

Leite, R., (673) (Hel.)
Leiva, L., (499) (Z.)
Lellis, A., 252, (673) (Hel.)
Lelong, M., with Courcoux & Cordey, 746 (Und.)
Lemaire, N., 569 (Y.F.)
Lemann, I. I., 430, 431 (Misc.)
Lemoine, G. H., (872) (Mal.)
Lenoble, E., & Jegat, Y., 682 (Am.)
Le Noir & de Fossey, M., 688 (Am.)
Lenz, W., 613 (Misc.)
Léo, G., 199 (Hel.)
Léon, N., 116 (Z.)
——, & Ciurea, I., 651 (Hel.)
Leone, R., 299 (Mal.), 690 (Am.)
Lepine, 145 (S.S.)
Le Roy des Barres, A., 704 (Dys.)
Lesage, A., 384 (Chl.)
Levaditi, C., with Sazerac, 143 (S.S.)
Le Vilain, with de Goyon, 168 (Der.)
Levy, M. D., 343 (Dys.)
Leynen, E., with Bessemans, 884 (S.S.)
Lhéritier, A., with Sergent, Edm. & Et., & Donatien, 148 (S.S.)
Lhuerre, 760 (Bb.)
Li, T. M., 56 (Oph.)
Lichtenstein, A., 41 (Dys.), 327, 679 (Am.)
Linden, W. Z., with Breëne, 609 (Misc.)
Lindtrop, G., with Sdrodowski, 854 (Mal.)
Lisbonne, M., & Carrère, L., 699 (Dys.)
Lister, S., 438 (Misc.)
Llambias, J., & Lorenzo, D., 173 (Der.)
Lobel, A., with Staicovici, 61 (Oph.)
Lockhart-Mummery, J. P., 49 (Dys.)
Loewenthal, W., 47 (Dys.)
Loewy, J., 289 (Mal.)
Van Loghem, J. J., 727 (Pl.)
Loir, A., & Legangneux, H., 843 (Z.)
Lombard, P., & Béguet, M., 353 (Und.)
Lonjarret, 876 (S.S.)
van Loon, F. H., 356 (B.R.), 791 (Misc.)
Lorenz, F. H., 35 (Dys.)
Lorenzo, D., with Llambias, 173 (Der.)
Lornie, P., & Jones, D. E., 695 (Dys.)
Loubrieu, with Paisseau, 576 (Mal.)
Loughnan, W. F. M., 70 (Fev.), 840 (Z.)
Louis, D. J., 846 (Z.)
Louys, G., 795 (Misc.)
Low, G. C., & Newham, H. B. G., 503 (S.S.)
——, & O'Driscoll, E. J., 226 (Hel.)
Lucey, H. C., 290 (Mal.)
Lucie-Smith, J. D., 447 (B.R.)
Ludlow, C. S., 483 (Z.)
Luhn, O. G. F., 162 (Der.)
Luisi, 734 (Pl.), 875 (S.S.)
Lumbroso, U., 710 (Oph.)
Lynch, K. M., 171 (Der.), 819, 824, (849) (Z.)

M

MacArthur, W. P., 470 (Z.)
MacCallan, A. F., 243 (Hel.)
MacCallum, W. G., & Moody, L. M., 438 (Misc.)
McClugage, H. B., with Givens & van Horne, 419 (Sc.)
McCord, C. P., Kilker, C. H., & Minster, D. K., 167 (Der.)
McCornack, P. D., 119 (Z.)
McCready, J. W., 426 (Pel.)
MacDonald, A., 577 (Mal.)
McDonald, F. R., 330 (Am.)
MacDonald, N., with Chalmers, 175 (Der.)
McDonald, W. M., 70 (Fev.), 572 (Mal.)
McFarland, W. L., 654 (Hel.)
——, with Teague & Bates, 435 (Misc.)
Macfie, J. W. S., 433 (Misc.), 482 (Z.)
——, & Ingram, A., 434 (Misc.), 484, (850) (Z.)
——, with Carter & Ingram, 114 (Z.)
McGee, H. S., 598 (Der.)
McGill, C., 343 (Dys.)
MacGregor, M. E., 473, 476, 483 (Z.)
McKendrick, A. G., 79 (Misc.)
Mackey, G., 84 (Misc.)
Mackie, F. P., with Fox, 310 (K.A.)
——, with Trasler, 701 (Dys.), 736 (Chl.), 770 (Lab.)
McKinstry, W. H., 317 (K.A.)
McLay, K., 570 (Mal.)
——, with Wenyon, Anderson, Hele & Waterson, 889 (B.R.)
McMillan, T. M., with Weidman, 597 (Der.)
MacNaughton, J. G., 609 (Misc.)
Macpherson, W. G., Herringham, W. P., Elliott, T. R., & Balfour, A. [Edited by], 800 (B.R.)
Macrae, A., 63 (Oph.)
McVail, J. B., 249 (Hel.)
McWhae, D. M., & Jagger, T. R., 203 (Hel.)
de Magalhaes, A., 591 (Lep.)
de Magalhaes, P. S., 163 (Der.), 608 (Misc.)
Mahulete, J., (850) (Z.)
Maië, S., 594 (Lep.)
Maki, R., with Kato & Shizume, 75, 413 (Bb.)
Malaria-Commissie voor Noordholland, 282, 855 (Mal.)
Mallardi, M., 313 (K.A.)
Malone, R. H., 86, 605 (Misc.), 769 (Lab.)
——, & Goré, S. N., 81 (Misc.)
Manini, L., 31 (Am.)
Mansoor, R., 732 (Pl.)
Maplestone, P. A., 258 (Hel.)

Marais, D. P., 746 (Und.)
Marantonio, R., 572 (Mal.)
Marchand, H., 594 (Lep.)
Marchoux, E., 280, 291, 575 (Mal.), 396 (Lep.)
——, & others, 570 (Mal.)
Marcou, H., 871 (Mal.)
Marinesco, M. G., (300) (Mal.)
Mario, S., with Graziadei, 706 (Dys.)
Marshall, C. H., 141 (S.S.)
——, with Eyre, 141 (S.S.)
——, & Vassallo, S. M., 141 (S.S.)
Marshall, J. F., 829 (Z.)
Martini, E., 110, 114, 474, 483, (499) (Z.), 358 (B.R.)
Marzin, G., & Gambier, A., 168 (Der.)
Marzinowsky, E. J., 824, 836 (Z.)
Masaki, S., 382, 383, 737 (Chl.)
Massia, G., with Nicolas & Dupasquier, 423 (Pel.)
Mas Soeradji, with Schuurmans Stekhoven, Jr., & Schuurmans Stekhoven, A. W., 665 (Hel.)
Matheu, C. P., 416 (Bb.)
Mathias, F., & Hauke, H., 694 (Dys.)
Mathieu, 584 (Mal.)
Mathur, S. N., 601 (Der.)
da Matta, A., 161, 166 (Der.), 196 (Hel.), 590 (Lep.), 841 (Z.)
Mattos, B., 393 (Lep.)
Mauriac, P., & Boyer, R., 214 (Hel.)
Maxcy, K. F., 50 (Dys.), 583 (Mal.)
Maxwell, J. P., 109 (Z.)
Mayer, A., 557 (R.F.)
Mayer, M., 158, 509, 879 (S.S.), 584 (Mal.)
——, & Menk, W., 508, 879 (S.S.)
——, & Zeiss, H., 133, 508 (S.S.)
——, & ——, with Giemsa & Halberkann, 879 (S.S.)
Maynard, F. P., 64 (Oph.)
Mayne, B., 868 (Mal.)
——, with Francis, 442 (Misc.)
Mazzocco, P., with Houssay, Otero, & Negrete, 497 (Z.)
Mebius, J., 220 (Hel.)
Meded. v. d. Burgerlijk. Geneesk. Dienst in Nederl.-Indië, 604 (Misc.)
de Medeiros, A., 405 (Tb.)
Megaw, J. W. D., 40 (Dys.), 67 (Fev.), 243 (Hel.), 551 (K.A.)
Mehrdorf, R., 318 (K.A.)
Mei, A., (672) (Hel.)
de Mello, F., 159, 161 (Der.), 437 (Misc.)
——, & Correa Afonso, P., 846 (Z.)
——, Nunes, J. P., & Ribeirom, J. L., (850) (Z.)
Mendelson, R. W., 432 (Misc.), 562 (Jaun.), 582 (Mal.), 599 (Der.), 755 (Fev.)
Menk, W., with Mayer, 508, 879 (S.S.)
——, with Mühlens, 31 (Am.), 134 (S.S.)
Méo, J., 601 (Der.), 614 (Misc.)
Mesnil, F., 825 (Z.)
Meyer, K. F., with Fleischner, Vecki & Shaw, 350 (Und.)
——, Shaw, E. B., & Fleischner, E. C., 749 (Und.)
Mhaskar, K. S., 242, 257, 662 (Hel.)
——, with Caius, 250, 662 (Hel.)
Michael, D. F., 496 (Z.)
Michail, D., 60 (Oph.)
Michel, P., with Mouriquand, 421, 422, 766 (Sc.)
——, with ——, & Barre, 766 (Sc.)
——, with ——, & Nicodiévitch, 762 (Bb.)
Michon, L., with Bonnet, 50 (Dys.)
Miginiac, 680 (Am.)
Milio, G., 309 (K.A.)
de Milita, V., 758 (Bb.)
Miller, D., 830 (Z.)
Miller, D. W., with Voegtlin, 883 (S.S.)
Miller, G. A., with Yakimoff, 461 (Z.)
Mills, P. S., 546 (K.A.)
Milton, F., (672) (Hel.)
Minoda, M., 335 (Dys.)
Minster, D. K., with McCord, C. P., & Kilker, 167 (Der.)
Minvielle, with Rémond, 352 (Und.)
Mironesco, T., 715 (Oph.)
Mita, K., 335, 693 (Dys.)
Mitamura, T., with Nagayo, Miyagawa, Tamiya & Tenjin, 494 (Z.)
Miyagawa, Y., 244 (Hel.)
——, with Nagayo, Mitamura, Tamiya & Tenjin, 494 (Z.)
——, & Takemoto, S., 202 (Hel.)
Miyake, M., (741) (Chl.)
Moinson, L., with Sartory, 432 (Misc.)
Monier-Vinard, with Klippel, 312 (K.A.)
Montana, 118 (Z.)
Monteiro, J. N. de S., (560) (R.F.)
Montel, L. R., 165 (Der.)
Montes, J. E., 762 (Bb.)
Montoya, T. W., 240 (Hel.)
Montpellier, J., 599 (Der.)
——, Degouillon & Lacroix, A., 172 (Der.), 229 (Hel.)
——, & Gouillon, P., 164 (Der.)
——, & Lacroix, A., 164 (Der.), 229, 230 (Hel.)
——, & ——, & Boutin, P., 230 (Hel.)
——, ——, & Barre, L., 766 (Sc.)
Moodie, W., with Dawson, 39 (Dys.)
Moody, L. M., 438 (Misc.)
——, with MacCallum, 438 (Misc.)
Moore, A. C., with Wadsworth, Langworthy, Stewart & Coleman, 561 (Jaun.)

Moore, A. H., 656 (Hel.)
Mora, A D., 368 (Pl.)
Moreau,R., with Diacono, 204 (Hel.)
Morin, G. H., 201, 207 (Hel.), 347 (Bl.)
Motais, F., 194 (Hel.)
Mouchet, R., 868 (Mal.)
——, with van Nitsen, 601, 603 (Der.)
——, ——, & Walravens, P., 87 (Misc.)
Mourgue, R., with Colin & Laignel-Lavastine, 504 (S.S.)
Mouriquand, G., & Michel, P., 421, 422, 766 (Sc.)
——, ——, & Nicodiévitch, 762 (Bb.)
Msciwoj, L., 692 (Dys.)
Mühlens, P., 227 (Hel.)
——, & Menk, W., 31 (Am.), 134 (S.S.)
Muir, E., 267 (B.R.), 389 (Lep.)
Mujica, J. C. A., (300) (Mal.)
Mukarji, R. M., 864 (Mal.)
Mulherin, F. X., with Mulherin, W. A., 860 (Mal.)
Mulherin, W. A., & Mulherin, F. X., 860 (Mal.)
Müller, L. R., 610 (Misc.)
Muñoz Ochoa, M., 566 (Y.F.)
Murata, M., 75 (Bb.)
Muraz, G., 500 (S.S.)
Murray, W. A., 129 (S.S.), 488 (Z.)
Müssig, R., 237 (Hel.)
Mutermilch, S., 618 (Misc.), 739 (Chl.)
Muto, M., 220, 221 (Hel.)

N

Nagayo, M., Miyagawa, Y., Mitamura, T., Tamiya, T., & Tenjin, S., 494 (Z.)
Nagger, S. B., 585 (Mal.)
Nakagawa, K., 215 (Hel.)
Nakanichi, H., with Ohomori, Ohhashi, Hara & Ota, 759 (Bb.)
Nand Lal, 80, 83 (Misc.)
Nankivell, A. T., with Hewlett, 176 (B.R.)
Napier, L. E., 311 (K.A.), 546, 550 (K.A.)
Nattan-Larrier, L., 130, 132, 133, 151, 515 (S.S.)
Navarro, A., 512 (S.S.)
Navarro-Martin, A., 512 (S.S.)
——, & Stefanopoulo, G. J., 513 (S.S.)
Neame, H., 393 (Lep.)
Nedergaard, N., 285 (Mal.), 458 (Z.)
Negrete, J., with Houssay, Otero, & Mazzocco, 497 (Z.)
Negroni, P., 733 (Pl.), (741, Chl.)
Neudörfer, A., (672, Hel.)
Neukirch, P., 292 (Mal.)
Neves, J. da S., 614 (Misc.)
Neveu-Lemaire, 92 (B.R.), 222 (Hel.), 734 (Pl.), (741) (Chl.), 855 (Mal.), 888 (S.S.)
Neveux, (300) (Mal.)
Neville, W. S. T., 55 (Oph.)
Newcomb, C., 359 (B.R.)
Newham, H. B., & Duncan, J. T., 797 (Misc.)
——, with Low, 503 (S.S.)
Newman, R. E. U., 554 (K.A.)
Newstead, R., 484 (Z.)
——, with Davey, 475 (Z.)
——, & Evans, A. M., 117, 490 (Z.)
Ni, T. G., 414 (Bb.)
Nicodiévitch, with Mouriquand Michel, 762 (Bb.)
Nicolas, J., & Favre, M., 799 (Misc.)
——, Massia, G., & Dupasquier, D., 423 (Pel.)
Nicolle, C., 310 (K.A.), 614 (Misc.), 708 (Oph.)
——, & Conseil, E., 742 (Und.)
——, & Cuénod, A., 59 (Oph.)
——, & Gobert, E., 204 (Hel.)
Nieschulz, O., 887 (S.S.)
Nieuwenhuijse, A., (589), 866 (Mal.)
Nishida, T., 237 (Hel.)
van Nitsen, R., 600 (Der.)
——, & Bequaert, M., 706 (Dys.)
——, & Mouchet, R., 601 (Der.)
——, with ——, 603 (Der.)
——, with ——, & Walravens, 87 (Misc.)
Niwa, T., with Yokoyama, 646 (Hel.)
Noc, F., 51 (Dys.), 367, 733 (Pl.), 834 (Z.)
——, & Jouenne, 597 (Der.)
——, & Nogue, 320 (R.F.)
——, & Baury, 878 (S.S.)
Noël, P., 392 (Lep.)
Noguchi, H., 563, (569) (Y.F.)
Nogue, 686 (Am.), 789 (S.S.)
——, with Noc, 320 (R.F.)
——, & Jouenne, 879 (S.S.)
Nomura, T., Sotoma, G., & Harada, S., 377 (Chl.)
de Nooy, J. A., 163 (Der.)
Normet, 168 (Sk.), 296 (Mal.)
Norris, D., 80, 81 (Misc.)
Nossen, H., with Rosenthal, 520 (S.S.)
Nowlin, N., 827 (Z.)
Nusshag, W., 883 (S.S.)

O

O'Driscoll, E. J., with Low, 226 (Hel.)
Obrenovitch, E., with Dupérié, 586 (Mal.)
Ochsenius, K., 667 (Hel.)
Oda, S., 739 (Chl.)
Oehler, R., 103 (Z.), 777 (Lab.)
d'Œlsnitz, Balestre, P. L., & Daumas, A., 550 (K.A.)
Oesterlin, E., 158 (S.S.)

Oettinger, J., & Halbreich, J., 557 (R.F.)
Ogata, N., with Ishiwara, 754 (Fev.)
Ogata, T., 75 (Bb.)
Ogawa, T., with Shimura, 223 (Hel.)
Ohara, M., 592 (Lep.)
Ohhashi, Y., with Ohomori, Nakanichi, Hara & Ota, 759 (Bb.)
Ohkura, T., 740 (Chl.)
Ohomori, K., Ohhashi, Y., Nakanichi, H., Hara, M., & Ota, T., 759 (Bb.)
Ohyama, H., 384 (Chl.)
Olinescu, R., 860 (Mal.)
Oliveau, A., with Legendre, 111 (Z.)
de Oliveira, G., 131 (S.S.)
Olpp, 569 (Y.F.)
O'Malley, J. J., 444 (Misc.)
Onji, Y., 219 (Hel.)
Onorato, R., (560) (R.F.), 650, (673) (Hel.)
Orlebar, A., 293 (Mal.)
Ormond, A. W., 711 (Oph.)
Ornstein, M., 333 (Dys.)
Ornstein, O., 740 (Chl.)
Ortega, D. B., (300) (Mal.)
Ota, M., 596 (Der.)
Ota, T., with Ohomori, Ohhashi, Nakanichi, & Hara, 759 (Bb.)
Otero, M. J., with Houssay, Negrete & Mazzocco, 497 (Z.)
Otsubo, I., 380 (Chl.)
Ouzilleau, Laigret & Lefrou, 231 (Hel.)
——, with Lefrou, 505 (S.S.)
Oyama, T., with Kumagaya, Katsura, & Saito, 762 (Bb.)
Oyarzábal, J., with Dios, 157 (S.S.)

P

Pacheco, L. R., with Green, 63 (Oph.)
Paez, F. R., 104 (Z.), (416) (Bb.)
Pagenstecher, G. A., 598 (Sk.)
Paisseau, G., & Loubrieu, 576 (Mal.)
—— , Schaeffer, H., & Alcheck, E., 294 (Mal.)
Palermo, P., 236 (Hel.)
Palestine, 853 (Mal.)
Palfrey, F. W., with Wolbach & Todd, 448 (B.R.)
Pansini, G., (872) (Mal.)
Pantaleoni, D., 599 (Der.)
Papastratigakis, C., 859 (Mal.)
Paranhos, U., & Reis, P., 27 (707), (Am.)
Parcellier, A., with Sabrazès & Bonnin, 238 (Hel.)
Parisot, J., & Simonin, P., 819 (Z.)
Parker, R. R., 119 (Z.)
Parmanand, M. J., 561 (Jaun.)
Parounagian, M. B., & Goodman, H., 602 (Der.)
Parrot, L., 173 (Der.), 316 (K.A.), 347 (Bl.), 484 (Z.)
——, & Donatien, with Sergent, Edm. & Et., 280, 870 (Mal.)
——, with Donatien, 886 (S.S.)
——, with Foley, 166 (Der.)
——, with França, 484 (Z.)
——, with Sergent, Edm. & Et., 823 (Z.)
——, with ——, Donatien & Béguet, 315 (K.A.)
——, with ——, & Foley, 478 (Z).
——, with Vialatte, 484 (Z.)
de Partearroyo, F. R., 741 (Chl.)
Patel, P. G., with Cross, 873 (S.S.)
Patterson, H. A., (672) (Hel.)
Patterson, S. W., & Williams, F. E., 48, 697 (Dys.)
Patton, W. S., 115, 117, 465, 485, 486, 487, 837, 838, 839, 840, 841, 846, (850), (Z), 302 (K.A.)
——, La Frenais, H. M., & Sundara Rao, 304 (K.A.)
Pavy, H. K., 213 (Hel.)
Pawan, J. L., 483 (Z.)
Payne, F. K., with Ackert, 664 (Hel.)
Payne, G. C., with Cort & Augustine, 664 (Hel.)
Pearce, L., 136 (S.S.)
Pease, R. A., with Eddy & Shelow, 420 (Sc.)
Pedley, F. G., 343 (Dys.)
Pedrosa, A., 314 (K.A.)
Pelletier, J., & Quemener, 348 (Bl.)
Peltier & Cavazza, 436 (Misc.)
Pennato, P., 579 (Mal.)
Pennington, J. R., 607 (Misc.)
Pentagna, O., 656 (Hel.)
Pentland, C., 236 (Hel.)
Pequeno (Junior), P. A., (673) (Hel.)
Perkins, G. A., 592 (Lep.)
Pessôa, S. B., 656 (Hel.)
Peutz, J. L. A., (589) (Mal.)
de Pfeffel, with Guinon, (376) (Pl.)
Pfeiler, W., 511 (S.S.)
Philippine Health Service, 394 (Lep.)
Phisalix, M., 622 (B.R.)
—— , & Tejera, E., 107 (Z.)
Piccininni, F., 729, 730 (Pl.)
Pijper, A., 429 (Misc.)
Pillay, T. M., 238 (Hel.)
Piltz, G., 703 (Dys.)
Pino-Pou, R., 557 (R.F.)
Pinoy, E., 174 (Der.)
Pinto, C., 155 (S.S.)
——, with Godoy, 856 (Mal.)
Pirie, J. H. H., with Welchman, 164 (Der.)
Platz, C., 737 (Chl.)
Pol., O. J. H., (707, Dys.)

Polidori, V., 165 (Sk.), 775 (Lab.)
Pomaret & Andréani-Constantini, 208 (Hel.)
——, with Jeanselme & Schulmann, 225 (Hel.)
Pons, 345 (Bl.)
Popesco, C., with Jonesco, Mihaesti- 700 (Dys.)
Popowski, N., 240 (Hel.)
Popper, M., with Ionesco, 582 (Mal.)
Porter, A., 206 (Hel.)
Posse, R., with Vaccarezza & Inda, 897 (B.R.)
Pottevin, (384) (Chl.)
Poupelain, 165 (Der.)
Pratsicas, A., 863 (Mal.)
Prentiss, E. C., 33 (Am.), 51 (Dys.)
Pringault, E., with Leger, 201 (Hel.)
Priston, J. L., with Sanders, 202, 211 (Hel.)
von Prowazek, S., 176 (B.R.)
Public Health Reports, 425 (Pel.)
Puente, J. J., 776 (Lab.)
Pulgher, F., (735, Pl.)
Pupo, A., 170 (Der.)
Pusa, 4th Entomological Meeting, 845 (Z.)

Q

Quemener, with Pelletier, 348 (Bl.)
de Quervain, F., 603 (Der.)
Quiros, M., 568 (Y.F.)

R

Raabe, H., with Anigstein, 827 (Z.)
de Raadt, O. L. E., 90, 524 (Misc.)
Raiziss, G. W., with Schamberg & Kolmer, 143 (S.S.)
Raja, R. N., 864 (Mal.)
Ransom, B. H., & Cram, E. B., 234 (Hel.)
Rathery, F., & Cambessédès, 57 (Oph.)
Ravaut, P., 627 (B.R.)
——, & Charpin, 24 (Am.)
Rayson, H. K., 865 (Mal.)
Reed, A. C., with Ely & Wyckoff, 684 (Am.)
Reed, W. A., & Wolf, M., 171 (Der.)
Regnault, F., 856 (Mal.)
Reh, M., 585 (Mal.)
Reich, W. W., with Beckwith, 156 (S.S.)
Reichenow, E., 127, 128 (S.S.), 495, 849 (Z.)
Reis, A. P., 798 (Misc.)
Reis, P., with Paranhos, 27, (707) (Am.)
Remlinger, P., 319 (K.A.), 408 (Tb.), 522 (Misc.)
Rémond, A., & Minvielle, 352 (Und.)
Renč, V., 776 (Lab.)
Rénon, L., & Blamoutier, P., 31 (Am.)
Reverdin, H., & Chomé, E., 463 (Z.)
Reynolds, F. H. K., & Schoening, H. W., 884 (S.S.)
Rheuben, J. A., with Legg, 258 (Hel.)
Rice, L., 752 (Fev.)
Richet, C., fils, with Sainton & Schulmann, 578 (Mal.)
Rieux, G., & Delater, G., 859 (Mal.)
Rieux, J., 577 (Mal.)
Riganti, H., 691 (Dys.)
Righi, I., 554 (K.A.)
Rigollet, 297 (Mal.), 368, 728 (Pl.)
Riley, W. A., 471, 842 (Z.)
Rincones, P. G., (560) (R.F.)
Risquez, J. R., 201, 202, 213 (Hel.)
Roaf, H. E., 322 (R.F.)
Robertson, A., with Thomson, 23 (Am.)
Robertson, O. H., with Kligler, 323 (R.F.)
Robertson, R. C., with Coppinger, 698 (Dys.)
Rockefeller Foundation, 529 (Misc.), 900 (B.R.)
Röckemann, W., with Rodenwaldt, 665 (Hel.)
Rodenhuis, Y., 331 (Am.), 625 (B.R.)
Rodenwaldt, E., & Röckemann, W., 665 (Hel.)
Rodhain, J., 228 (Hel.), 517 (S.S.), 844 (Z.)
——, with Broden, 506 (S.S.)
Rodino, N., 326 (R.F.)
Roger, G. H., Widal, F., & Teissier, P. J., 804 (B.R.)
Rogers, L., 328 (Am.), 527 (Misc.)
Rohr, C., 160 (Der.)
Rokkaku, T., with Ujihara, 412 (Bb.)
Romero, N., 386 (Ent.)
Romero Sierra, J. M., 107 (Z.)
de Rook, H., with Brug, 830 (849) (Z.)
Root, F. M., 828 (Z.)
Roques, E., with Laporte, 682 (Am.)
Rose, F. G., 224 (Hel.)
Rose, W., 900 (B.R.)
Rosenblatt, S., with Kling & Bernstein, 332 (Dys.)
Rosenthal, F., & Freund, R., 888 (S.S.)
——, & Krueger, M., 154 (S.S.)
——, & Nossen, H., 520 (S.S.)
Ross, R., 574 (Mal.)
Roth, G. B., 80 (Misc.)
Roubaud, E., 113, 476, 478, 485 (Z.), 280 (Mal.)
——, & Franchini, G., 821 (Z.)
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NOTE.—The Director would consider proposals for the exchange of the Bureau publications with other medical and scientific journals in which original papers on tropical diseases or parasitology are published.

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